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Safety Feed Increases Production

Augmenting Punch Press Output by Using
Automatic Feeding Attachments of Various
Types—Average Increase 150 Per Cent

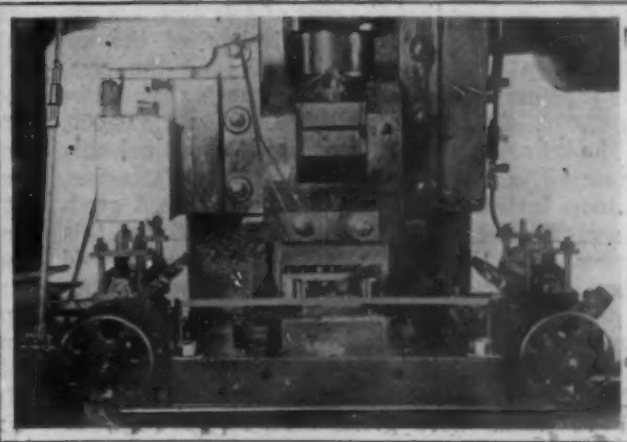
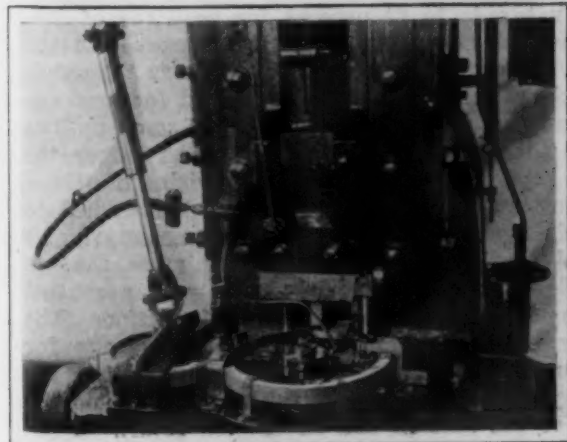
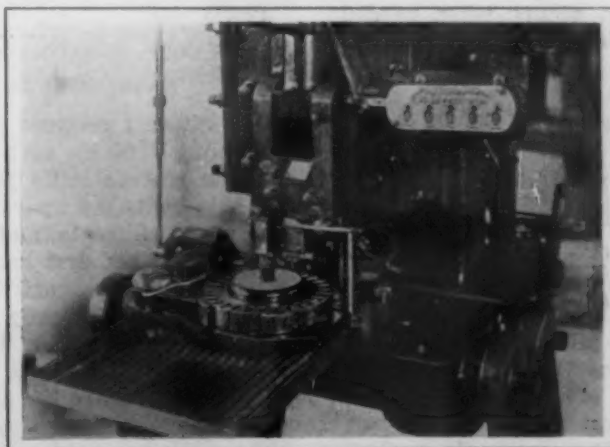
A not uncommon complaint against safety devices, as applied to punch presses, has been their alleged interference with production. Interesting examples of attachments, which have not only promoted the safety of the operator but have more than doubled the output of the machines involved, are presented in the accompanying illustrations. These machines are installed in the plant of the Felt & Tarrant Mfg. Company, Chicago, and are employed in the manufacture of parts for the Comptometer.

The machine shown at the top is fitted with a revolving dial operated from an eccentric on the main shaft with rod connections to a gear and ratchet mechanism. As shown, this dial is made with a large number of die apertures arranged continuously and concentrically around the circumference of the dial. The operator inserts the pieces to be formed in the receivers in the half of the dial removed from the punch and the rotation of the feed dial automatically brings the piece into position for the operation, so that the operator's hands at no time are in proximity to the punch and die at the dangerous interval. The electric bell shown at the left of the dial

gives a warning signal, to indicate when a piece of work may not be properly seated in the die in which event the piece makes a contact with a detector point just before coming into position for the press operation, thus closing the bell circuit. The operator can then stop the machine and correct the difficulty. The attachment of the above fixture has been responsible for an increase in the output of this press from about 1200 pieces per hr. to 3000.

An automatic-feeding mechanism serving a similar purpose but with a somewhat different operating arrangement is illustrated at the left of the lower row. Here the work dial is arranged for receiving four pieces, the receiving dies being placed 90 deg. apart. The periphery of the feeding dial is a spur gear which meshes with an intermittent driving pin-

ion actuated from the main shaft through a universal joint connection, a portion of which is shown at the left of the press. This drive is positive and accurate, in bringing the die into alignment with the punch. An air connection leading to a valve and then extended by a bent brass tube to bring the special nozzle into position for blowing the die clean is shown at-



Three Types of Automatic Feeding Attachments Applied to Punch Presses Producing Small Parts to Increase the Output. At the top is a ratchet-driven feed dial, below at the left is shown a safety feed dial having an intermittent gear drive and at the right is a press equipped with a friction roller feed for sub-die operation

tached the frame of the press. The protruding stem of the air valve engages with a block on the plunger which determines the point and interval at which the air jet is turned on and off.

At the lower right, a friction roller attachment for the automatic feeding of long strips where the blanking operation is performed with a sub-die, is

shown. The friction rolls are driven by a ratchet attachment which also limits the feed between each operation within the severe requirements of accuracy demanded for the work. This feeding attachment has increased production on this press, as compared with the output with hand feeding, from 2000 to 5000 pieces per hr.

Works Apprentice School Discontinued

Cost per Graduate One Reason—Scientific Management Another in Minimizing Demand for Labor—Public Vocational Schools a Third

To abandon a works apprenticeship school seems a retrograde step at this time of prominent consideration to shop education in mechanical pursuits; but the H. H. Franklin Mfg. Company, maker of the Franklin automobile, Syracuse, N. Y., has done just this thing and for very good reasons, so it believes. The following account of the experience will show why the company no longer conducts its technical classes. Briefly, the cost per individual graduated has been high, but the continued need for new employees has practically vanished with the expansion of scientific management within the works. A widening circle of satisfied workers and a razing of the peaks of the usual highly variable demands for labor have resulted, and the new conditions have naturally lightened the tasks of the employing officers. Besides this gain derived by the inauguration of scientific management in maintaining substantially a constant number of employees throughout the year, a vocational high school is being erected in Syracuse and from this the company is sure it can secure when needed boys who, with some additional expenditure on them, can be developed quickly to meet the company's requirements. In fact the company holds that applicants from the vocational school would know what they want and would be more than likely retained in any continuation course which the company might plan.

The per capita cost of the graduate, so to speak, from the company's apprenticeship school was, however, an important item in the decision to discontinue the school. The total cost of running the school, not comprehending overheads which could properly be charged, was \$17,000 for the four years covering the existence of the school, and the total output was 28, or a cost to the company of \$607 for each apprentice. The company's employment figures show that the cost of selecting a workman and making him the equivalent of the apprenticeship school output is \$50, and the company considers that it can charge itself with a loss of \$17,000 — $28 \times \$50 = \$15,600$, or, say, \$15,000.

The school was established to give boys not only a training in the regular work of manufacturing, but some instruction in technical subjects. A graduate of Purdue University was engaged for this purpose, and the boys were not, as in the old system of apprenticeship training, turned loose to the tender mercies of this or that foreman. The course was for 200 weeks, or 4 years.

The class room and text book work, two periods of 2 hr. each were arranged every week. In the first year 10 weeks were given over to a review of arithmetic and 40 weeks to studying algebra. The second year's technical instruction was devoted to

plane geometry. Half of the third year was taken up with trigonometry and the other half with studying the elements of machine design. Elements of machine design and shop mathematics constituted the fourth year's work. These lessons were for $\frac{1}{2}$ to $\frac{3}{4}$ hr. and the remainder of each 2-hr. period was taken up with mechanical drawing work in the first two years and with the analysis of different machines in the last two years. A short course in shop supervision was also undertaken. The shop training was as follows:

First year	
Drilling	10 weeks
Milling	24 weeks
Lathe work	16 weeks
Second year	
Lathe work	10 weeks
Bench work	12 weeks
Turret lathes	8 weeks
Gear shapers	8 weeks
Automatic screw machines.....	12 weeks
Third year	
Grinding	8 weeks
Tool work	18 weeks
Erecting	12 weeks
Small assembly	12 weeks
Fourth year	
Tool drawing	26 weeks
Tool work	24 weeks

WAGES PAID TO APPRENTICES

The students received payment for actual service, totaling 2700 hr. each year. The rate for the first year was 11 cents per hour; for the second year, 13½ cents per hour; for the first half of the third year, 16 cents and the second half 18½ cents, and for the first half of the fourth year, 21 cents and for the second half, 23½ cents. When the student satisfactorily completed his term of instruction of 10,800 hr., the company paid him a bonus of \$100. This was promised as an inducement to him to make the effort to finish the course and he was presented also with a diploma.

The underlying idea in providing the course was naturally to fit persons for positions of usefulness and responsibility in the company's service. With the changes in conditions, such as the public vocational school and a reduced need for new employees, as already mentioned, the company has come to regard its own school as no longer the main hope it had of filling its supervising positions. At no time, however, did it expect the student to remain against his wishes nor that necessarily he would continue with the company after the expiration of the course, but there was a mutual agreement covering the cessation of relations. The application which the student made formally for entrance into the work breathed a broad-gauge attitude, demanding applied, faithful interest on the part of the student and offering in return on the part of the company and at a generous wage rate to instruct the student in the machinist's art and

trades. Applications were limited to boys of 17 to 20 years of age. The first twelve weeks constituted a term of trial.

FIGURING THE COST OF THE SCHOOL

With regard to the item covering first year's pay, there were 31 students who finished their first year. Not counting any losses at all to the company for instruction in this year, the student has received 11c. per hour for 2700 hr. Those who stayed less than one year averaged 3 months, and as they received at least 10 cents a day, besides involving other incidental expenses, the per capita cost is put at \$100 apiece. This cost per student is about \$600 for each graduate as stated.

The actualities of the technical course are that it was put into operation on April 4, 1910; that up to November 1, 1914, there were 79 applications; that of this number, 59 were accepted; that of the 59, 52 took up the work, and that of the 52 entering, 28 remained in the course, or about one-third as many as applied and one-half as many as entered. Those who resigned left for the following reasons: Lack of ability, or lack of interest, 10; to obtain other positions, 3; for higher education, 2; due to low wage, 2; sickness, 2; marriage, 2, and for reasons unknown, probably due to low wage or lack of interest in the work, 3.

The student cost has been figured as follows:

Instructor's salary, at \$700.....	\$2,800
First year pay for entrants, 31 at \$300.....	9,300
Expense in pay for less than one year for 21, at \$100	2,100
Prize for graduates at \$100.....	2,800
Total paid	\$17,000

This total figure does not include rental for building occupied, light, heat, or depreciation, repair, interest on buildings, machines and other physical equipment. It does not include allowance for extra foremanship in the shops, that is, time taken by regular foremen, nor miscellaneous expense of correspondence, committee meetings or student class supplies. The \$700 for instructor's salary is somewhat less than one-half of that of the person acting as instructor; the remainder of his salary being devoted to instruction in repairmen's courses and is not included in apprenticeship school.

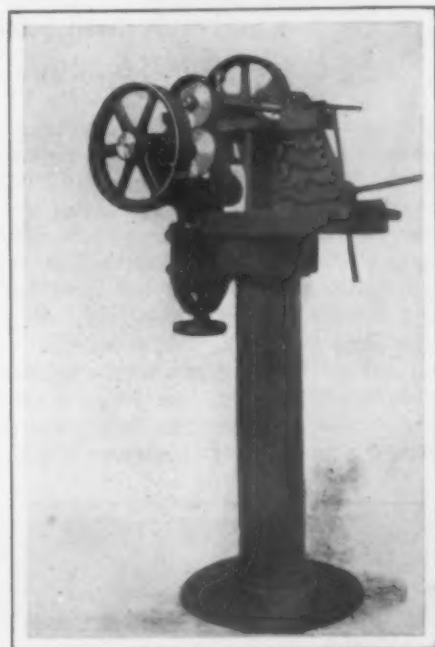
A Duplex Piston Ring Milling Machine

For slotting piston rings in sizes from 1½ in. to 14 in. in diameter, C. F. Fulmer, 535 North avenue, Plainfield, N. J., has produced a duplex milling machine. The cutters are offset one above the other, and are driven independently by pulleys. The two arbors that carry the cutters and driving pulleys rest in bearings at the ends of unequal arms of a crotch-shaped casting that is clamped in a split hollow cylindrical bearing on one side of the frame of the machine. The frame is bolted to a standard which is a length of 6-in. pipe.

The ring to be cut is fastened upon an elevated movable table which fits into the slotted bed plate. The ring is fed to the cutters by a pilot wheel that operates a ratchet on the front of the frame. The piston ring is held on the table by means of a cam clamp, which forces it against elevated stops by bringing down an arm having hard steel bearing strips. A slight turn of a lever operates the cam, causing these strips to press down on the ring at each side of the cutters. The end of the arm is U-shaped to allow for the cutters.

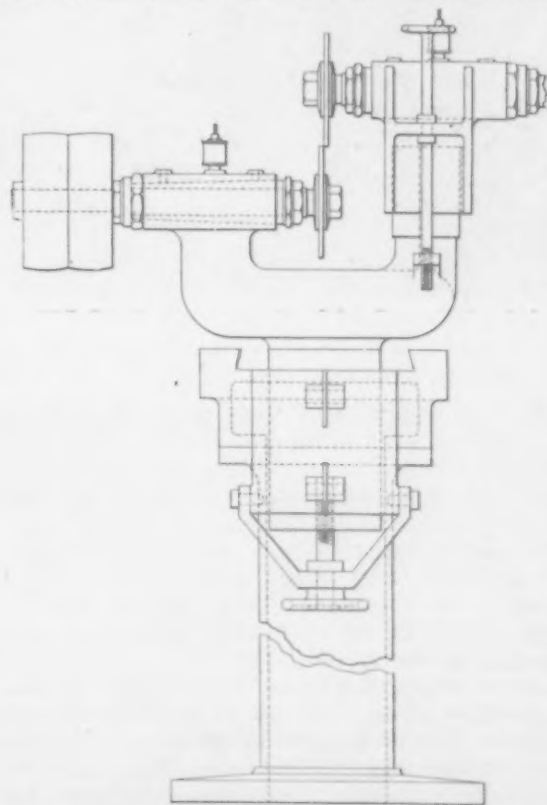
Both vertical and horizontal adjustments are provided for the cutters. The horizontal variation is made by turning nuts at each end of the arbors

carrying the cutters. This adjustment keeps the edges of the teeth so close that when they cut through the metal, they come as near to meeting as possible without doing so. Two vertical adjust-



A Milling Machine for Slotting Piston Rings. Above the Adjustment Wrenches is the Elevated Table of the Carriage, on the Top of Which is the Cam Lock for Holding the Piston Ring on the Table

ments are provided, both operated by handwheels. To keep the cutting line of the saws at the same elevation, the upper handwheel is turned to raise or lower the upper arbor and so bring the cutting points of the wheels together. To keep the cutters



Front View of the Milling Machine, the Elevated Table Which Carries the Ring Having Been Removed

at the right height to meet the middle of the ring being cut, a similar operation of the lower handwheel raises the crotch-shaped casting carrying both cutters. These adjustments can all be made to a fineness of 0.001 in.

New Forge Shop of Upson Nut Company

Modern Bolt and Nut Works in Which the
Equipment, Arrangement and Systems
for Handling Material Are Features

A forge shop recently erected by the Upson Nut Company, Cleveland, Ohio, as a part of its bolt and nut works has a number of unusually interesting features including the arrangement of the plant and machinery for convenience and economy in production, its very complete equipment for the handling of material by means of three handling systems and its furnace equipment. In the fall of 1912 this company began the first construction work in replacing its old bolt and nut works with a modern and much larger plant, the forge shop being the first unit to be erected. The rebuilding operations presented some difficult problems for the rea-

loaded from boats at the company's blast furnace along the Cuyahoga River, scarcely more than a stone's throw from the bolt and nut works. The molten metal from the blast furnace goes to the open-hearth furnaces of the steel plant and is converted into ingots and later into billets on the blooming mill and rolled down into bars in the finishing mill; thence the material goes to the bolt and nut works, about 50 per cent. of the output of the steel plant being consumed in these works.

The forge shop occupies a steel frame building 620 ft. long from north to south and 180 ft. wide. Toward the north end it is tapered off somewhat



Fig. 1—View of West Bay from the North End and Showing a Portion of the Hot Nut Department with Stock Piles in the Foreground

son that all departments were kept in operation while sections of the old plant were being torn down and rebuilt, the difficulties being increased by the fact that more than one-half of the new plant is on the site of the old.

The new forge shop was erected in two sections, the first being placed in operation about a year ago. The shop now adjoins the old finishing department, which will eventually be replaced with a six-story building, 450 x 180 ft., which will be used for tapping, threading, making cold pressed nuts, machine shops and packing and shipping departments. The products of the plant include a full line of carriage and machine bolts, track bolts, hot and cold pressed nuts, rivets and coach and lag screws. The products of the forge shop at present include hot made bolts, nuts and rivets.

An interesting feature of the Upson plant is that all of the manufacturing processes, from smelting the ore to the manufacturing of bolts and nuts, are carried on in this plant which covers approximately 26 acres. Lake Superior iron ore is un-

on the east side, conforming with the building site, which adjoins several railroad tracks on that side. At the south end where it now connects with the old finishing department, a 30-ft. extension will be added when the new finishing department is built. The shop is divided lengthwise into three 60-ft. bays, and into twenty 30-ft. bays crossways, and a 20-ft. bay connects it to the office building. The sides are bricked up to a distance of about 8 ft. and from that point to the crane rail there is a section of continuous glass, and two sections of continuous windows above the crane rail. In the roof there are 20 transverse sawtooth sections, one section in each bay except in the 20-ft. one. As the glass roof sections face the north, the direct sunlight is avoided. With the large amount of glass surface on the sides and the roof, the shop is well lighted throughout. The windows are of ribbed wired glass and are in steel sash, furnished by the David Lupton's Sons Company. The sides of the building between the window sections and also the sides of the sawtooth roof sections are covered with

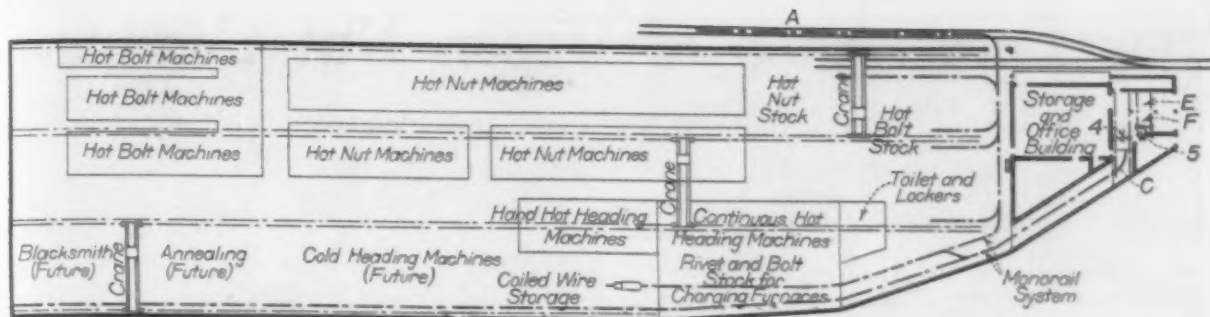


Fig. 2—Plan to Show Traveling Cranes, Traveling Monorail System and Other Handling Apparatus

asbestos protected metal. The roof is of tile. The floor is built up of 6 in. of reinforced concrete covered with 2 in. of sand on which paving brick is laid. The machines and furnaces are placed on concrete foundations.

Raw material enters the forge shop at the north-west corner where a depressed switch track runs into the building along the side wall, bringing the car floor on the level with the shop floor, and providing inside track space for three cars for loading finished products for shipment. The outside trackage is so arranged that five cars can be spotted on a track just outside the entrance along the west wall, thus providing space to spot 8 cars for unloading if desired. A large section in the center and west bay at the north end of the building is taken up with stock piles, and next to these, occupying the greater part of the remainder of the west side of the plant, taking in the west and part of the center bays, is the hot forged and hot pressed nut department. There are approximately 75 hot nut machines which are located on three platforms, the positions of which are shown in the accompanying general layout of the plant, Fig. 2. Most of these machines were built by the company from its own designs.

The arrangement of the forging machinery on platforms is a particularly interesting feature of this plant. These platforms are 5 ft. above the forge shop floor and the nut machines are placed along the edge of the platforms with the axes of the platforms and the center lines of the furnaces at an angle, making the handling of stock from the furnaces to the machines as convenient as possible. The platforms are of concrete with an overhang, providing space beneath the overhanging section for discharge spouts and piping. The space back of the machines and the furnace platforms is filled in with dirt so that the machine operator stands on a dirt floor. Fig. 1 is a view showing the west bay section of the hot nut department and Fig. 4, taken in the west bay, illustrates very clearly the construction of the platform.

Stock is conveyed in 5-ton bundles from the stock pile and is deposited on racks in front of the furnaces, as shown in Fig. 1. These bundles are

made up in the finishing mill, each bundle being tied together with two chains, and the stock is kept in this bundled form at the north end of the shop until it reaches the furnaces. The nuts pass from the machines through spouts to shop buckets having a capacity of 200 lb. each, located on the floor beneath the machines and alongside the aisle dividing the platform, as shown in Fig. 4. These buckets are placed on trays, each tray having a capacity of 24 buckets, and the loaded trays are conveyed by crane to the scales adjoining this department. After weighing and counting on the scale the nuts go to the old shop for tapping, finishing and keggings, the hexagon nuts first being burred, a battery of seven burring machines being located on the floor level at the south end of the hot nut platforms. Fig. 6 shows an aisle between the hot nut and hot bolt departments with the burring machine in this aisle at the right.

Scrap passes from the hot nut machines in another spout adjoining the one that delivers the nuts and is discharged into similar shop buckets and carried by crane and dumped into open-hearth charging boxes that are located in a trench at each end of the hot nut department, as shown in Fig. 6. This method of handling scrap is unique and convenient. The trench is just large enough in width to hold the charging boxes and sufficiently deep so the top of the box comes about to the floor level. Placing the receptacles in the trench puts them out of the way and makes it convenient to dump wheelbarrows of scrap into them. When the boxes are filled they are taken by the cranes to flat cars and conveyed to the steel plant where the scrap is charged into the open-hearth furnaces.

The south end of the west and center bays is occupied by the hot bolt department, shown in Fig. 5. The concrete platform in this department is 30 in. high, and is arranged somewhat in the form of the letter E. In the north cross-section, corresponding to the vertical section of the letter, are nine rod cutters. Bar stock is conveyed by crane in 5-ton bundles to racks in front of these cutters. Extending lengthways down the plant from the bar cutter section are three platform sections accommodating five rows of hot bolt headers.

Fig. 3—Elevation to Show the Material Handling System and the Use of the Lower Floors of the Office Building

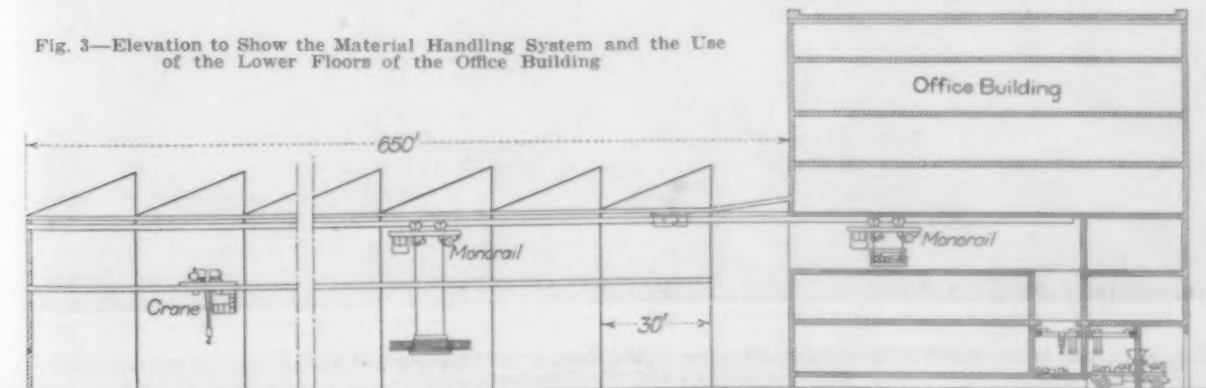




Fig. 4—One Aisle of Hot Nut Department in West Bay Showing Platforms, Spouts from Machines and Buckets in Which Nuts and Scrap Are Deposited. Piping Is Also Shown Beneath the Platforms

The machines are placed in a diagonal position on the platform which is constructed in zigzag form along the sides so that the edges of the platform are parallel to the sides and backs of the machines. This zigzag platform construction and arrangement of the machines provides more room on the platforms and width where it is required, and also more convenient floor space in the aisle for taking care of product that passes by gravity through

spouts from the headers to wheelbarrows placed in the right-hand corner of the zigzag, close to the machines. As stock is cut on the rod cutters, it drops by gravity into wheelbarrows at the back of the cutters and is wheeled to the various machines. After being heated and headed, the partially made bolts are wheeled to scales conveniently located, weighed and transferred to the finishing department. In the hot bolt department there are



Fig. 5—A Portion of the Hot Bolt Department Showing Zigzag Form of the Platform and Arrangement of Hot Bolt Heading Machines and Wheelbarrows.

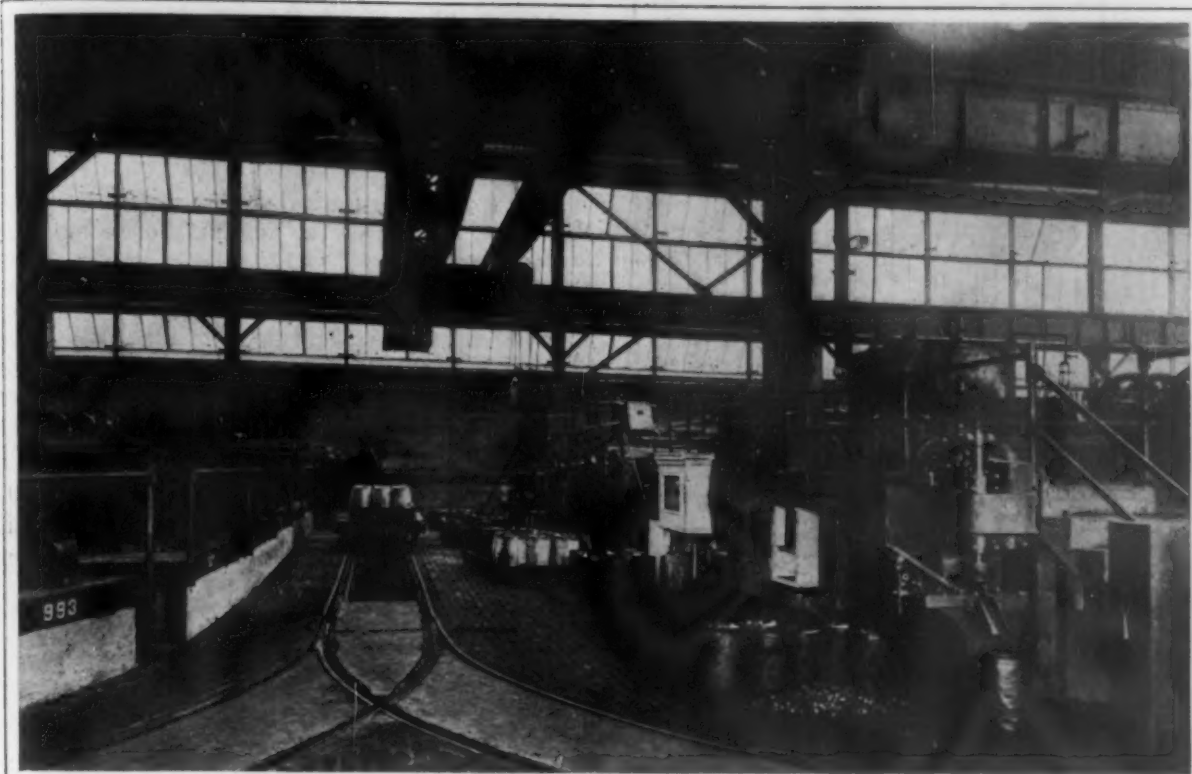


Fig. 6—Aisle Between Hot Nut and Hot Bolt Departments, Burring Machines on Floor Level in Aisle and Trench in Industrial Track for Charging Boxes Into Which Scrap Is Dumped. A Tray for Conveying 24 Kegs of Products Is Shown

about 50 bolt heading machines having a range of from $3/16$ in. to 2 in. in diameter.

The continuous header department shown in Fig. 7 is located on a 5-ft. platform in the center and east bays at the north end of the shop. This department is equipped with seven continuous heading machines for making rivets, track bolts, machine and carriage bolts. On an extension to this platform are six hand rod headers designed and

built by the company, for making machine and carriage bolts and particularly for filling small orders for products similar to those made on the continuous machines. Bar stock for the continuous machines is placed in racks at the front of the furnaces and is fed into them in 24-ft. lengths, one bar at a time, from four to ten bars being heated at once. The heated bars come out from the opposite end of the furnaces adjoining the machines. When a bar



Fig. 7—The Continuous Rod Header Department. Rockwell Long Rod Heating Furnaces Are Set Opposite the Heading Machines



Fig. 8—Monorail Conveying, a Notable Feature of the Plant

is fed up in a continuous machine, the operator signals the furnace charger, who pushes another rod through the furnace to the machine by means of a cold rod. The headed work drops through a chute into a dump bucket with a capacity of 3000 lb., one of which is shown in the aisle in Fig. 7. A crane takes the product to a section just north of the continuous machines where it is weighed and dropped on a cooling plate, inspected and sorted, and if of rivets, it is packed in kegs. If the bolts are to be roll threaded, this is done on roll threaders conveniently located in this department. Rivets and rolled thread bolts are taken to the loading platform at this end of the shop for shipment and loaded on cars on the depressed track. Bolts requiring cut threads are sent to the finishing department.

The furnace equipment, including the forge furnaces and hot bolt and hot nut departments and the long double end rod heating furnaces, was furnished by the W. S. Rockwell Company, New York. The furnaces are of a recent type, having a special economizer shield over the working opening which recovers a large percentage of the heat ordinarily wasted, and, at the same time, affords protection to the operator. The spent gases discharged from the working opening are deflected by the blast and away from the operator and against the tubes and heaters of the economizer, through which air for combustion is circulated, with the result that the air, taking up heat in its passage, is delivered hot into the furnace with the fuel. In addition to the advantages claimed for this furnace in the protection of the forge operator against the heat and gases from the working opening and the utilization of the heat and gases to preheat the air for combustion, resulting in economy in fuel, this type of furnace permitted a compact arrangement of the shop with the furnaces and machine units. This type of furnace was more completely described in *The Iron Age* of April 13, 1914.

The handling equipment includes three 10-ton electric traveling cranes, one of which spans each bay, an interesting monorail system, transfer bridges and an industrial railroad on which is operated a storage battery locomotive and trailers.

The combination of traveling cranes, monorail system and transfer bridges constitutes an ingenious method of handling material over a site of irregular shape and meeting an obstacle in the form of a six-story office building, which separates the manufacturing department from a point where city shipments are made.

Fig. 3 is a longitudinal section of the shop and shows the location of the adjoining office building to the problems that had to be met. In Fig. 2 the monorail track is indicated by a broken line and the position of the transfer bridges is at points 4 and 5. The monorail track runs into all three crane bays and is high enough to allow the trolleys to pass over the crane bridges. At the ends of the bays the floor space is accordingly served by both cranes and monorail so that the material is readily interchanged between the two systems.

At point C of the plan a similar relation exists between the monorail system and transfer bridge 4, while the transfer bridge trolley can run from bridge 4 to bridge 5 by locating them opposite a short piece of fixed track at point D. Communication is thus established from the manufacturing department through to the points E and F which are accessible to automobile trucks or wagons.

Cars of stock, when not taken into the shop on



Fig. 9—Concrete Piping Duct and Electric Conduits Under Industrial Railway Track. One of the Cover Plates for Duct is Standing on its Edge at the Left

the depressed track previously referred to, are switched to point A. At this point the monorail track is directly over the railroad track, thus permitting the ready transfer from gondola cars. The monorail trolley carries this stock into the building, depositing it into one of the bays as required. Thence it is distributed to the machines, except for the continuous hot headers, the latter being served directly by the monorail. The depressed track enters the building at the side of the west bay, thus permitting either the traveling crane in that bay or the monorail to serve cars on this track.

The rivet and bolt stock for the continuous machines is delivered by monorail system into the storage space on the east side of the plant, as indicated on the drawing, and subsequently removed by the same means when required and deposited beside the racks of the continuous furnaces in the east bay. The monorail is also used to lift bundles of stock off the floor and place them on the rack behind the continuous furnaces ready for charging.

The traveling cranes are used for transporting

the forged product to the finishing department at the south end of the plant, where it is machined and packed. When shipping by team or truck, kegs are loaded on large flat trays which the monorail trolley transports through the shop and into the office building where it lowers them down the hatchway at point C, depositing them on the floor. Transfer bridge 4 then picks up the load, runs to D, where the trolley runs off to transfer bridge 5; this is then brought over an automobile truck at E or F for shipment.

The monorail trolleys, which are 5 tons capacity, one of which is shown in Fig. 8, are provided with a hoisting mechanism of the 4-point-suspension type, so that the tray will not tip appreciably out of level, if the kegs upon it are loaded so as to throw more weight on one end or one side of the tray than on the other. When it is desired to carry bundles of bars the tray is unhooked and a lifting beam is attached to the frame which hangs on the cables. This beam is arranged to swivel, so that the bars can stand either parallel to the monorail track or at an angle thereto. When being picked out of the railroad cars and while in transit, they occupy the former position, a lock being provided to insure that the beam shall not swivel around accidentally when traveling on the straight, and that it shall



Fig. 10—A Cross Duct Connects Piping Ducts Under Zigzag Platforms. The Large Pipe at Top Supplies Air to Furnaces

remain parallel to the trolley when running around curves. When the destination is reached, the beam is unlocked and the bars swivelled around at right angles to the track by hand, before being deposited.

An ingenious system of electrical interlocking was installed to prevent a crane running up to the north end of the bay when that space is already occupied by a monorail trolley and similarly to prevent a monorail trolley entering a bay, the north end of which may be already occupied by a traveling crane.

The monorail runway comprises 1607 lin. ft. of track and six fixed-tongue track switches. These track switches are interesting because of the safety element which they introduce, the saving of time which they secure in consequence of it being possible for the trolley to run through them in any direction without stopping and because of their simplicity of construction. Each track switch consists simply of two massive steel castings bolted together, there being no moving part. If the operator desires to take the spur track, he pulls a lever, located con-

veniently to his hand in the operating-cage of the trolley, as he approaches the switch. This raises a heavy vertical pin in front of the leading truck, having at its upper end a roller, which, when thus raised, engages with a curved rib on the underside of the track switch, thus diverting the trolley to the spur track. If the operator does not pull the lever the trolley runs through the track switch on the main track. The contractor for the cranes, monorail system and transfer bridges was the Shaw Electric Crane Company, Muskegon, Mich.

An industrial track with a 42-in. gauge extends the length of the center bay into the old plant where it divides into a double track for empty and loaded trucks. This track handles raw and finished material throughout the shop and supplies from the stock room, supplementing the traveling cranes and telfer system in providing very complete handling equipment throughout all parts of the shop. At the north end of the forge shop there is a transverse track connecting with a Y and another transverse track extends from the main track to the west wall in the passageway between the nut and bolt departments. This spur is used as a transfer from the west bay, saving handling with a crane, and is also convenient for handling hexagon nuts, as the spur track runs alongside of the burring machines at the end of the hot nut department. On the industrial track is operated a storage battery locomotive which has a capacity of carrying a 5-ton deck load and will haul three trailers, each with a 5-ton load, the speed with maximum load being 4 miles per hour.

The space next to the hand rod headers to the east is used for wire storage, and beyond that in the east bay and the east half of the center bay, now occupied by cold nut machines, will be the cold-heading department which will be moved from the old plant and will be equipped with 60 cold-headers, upsetters, trimmers, annealing furnaces and tumbling barrels. The machinery in this department will be placed on the floor level.

The tool tempering room is located in the east bay at the south end of the shop. This is equipped with five heat-treating furnaces, one with a pre-heating chamber above, two large oil tempering baths and a lead bath, three oil quenching tanks, two water quenching tanks and a high pressure air line for air hardening. The hardening department is served by an I-beam trolley.

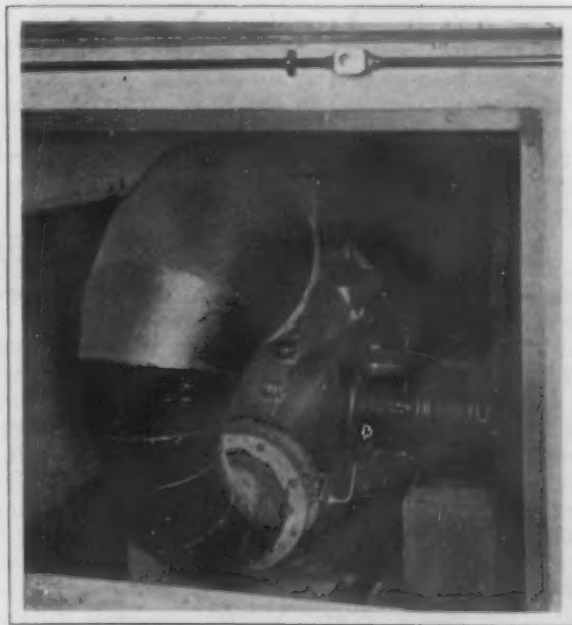


Fig. 11—One of 50-hp. Centrifugal Blower Sets in Pits Underneath Ends of Platforms. Intake Cowl is Shown at Left

All main line piping and conduit, except for steam heating and for electric lights, which are overhead, is carried on the side walls of a main duct that runs the length of the center bay underneath the electric railway track. This duct is built of concrete, the side walls carrying on their top the 60-lb. rails of the 42-in. gauge track. The piping in the duct includes lines for circulating water, air, oil and an electrical power line. Fig. 9 is a view in the tunnel, showing the location of the piping. The space between the track rails is covered with removable cast-steel sections. Fig. 10 shows the main pipe duct across the north end at the bolt department.

The oil supply for the furnaces is kept in three tanks, having a total capacity of 72,000 gal., in a concrete oil storage house a short distance from the shop, and an interesting oil circulating system has been installed. The oil is continuously circulated by means of two motor-driven rotary gear pumps, each having a capacity of four times the requirements. The main oil line that runs in the duct the length of the shop is 4 in. in diameter with a 3-in. return. Branches are taken off the supply line and run the length of the platforms to supply the furnaces, the return of these branches being to the main return in the duct. The end of the main line at the south end of the shop is closed with a valve to prevent circulation direct from the main to the return, the circulation being entirely back from the main to the return through the branches and their returns. At the end of the return in the oil house is an adjustable relief valve so that any pressure desired may be maintained.

For unloading the oil from tank cars a centrifugal pump with a capacity of 500 gal. per minute is installed in the oil house and with this the oil can be unloaded in one-fourth of the time required by the gravity method. The tanks are so located with reference to the railroad siding that their tops are below the bottoms of the tanks of tank cars. The unloading pump can also be used for pumping oil through the system in case of an emergency and it also can be used for emptying any tank into another tank. A 2-in. steam line is carried into the oil storage house so that should the oil catch fire, the tanks will be flooded with steam at 150 lb. pressure, the steam being automatically released by means of a fusible link connected to a quick-opening valve.

The water supply is so arranged that water for cooling tools on the machines can be taken direct from the lines connected with the city service or the water can be used over again by being drained from a settling pit, located in the floor under the hand headers. The water supply from the settling pit is circulated by means of two centrifugal motor-driven pumps with a capacity of 400 gal. per minute each against a 100-ft. head.

Air for the furnace blast for all furnaces, except those in connection with the continuous heaters, is supplied by four 50-hp. centrifugal air compressors, two of which are located under each end of one of the hot nut platforms. One of these compressors with its motor connection is shown in Fig. 11. Air is supplied at a pressure of $1\frac{1}{2}$ lb. and the air connections are so made that any one or more, or all the compressors may be operated at one time. For the continuous heading furnaces there are three 10-hp. compressors of the same type, one compressor being located between each pair of furnaces, which it serves. The larger compressors have a capacity of 5400 cu. ft. of free air per minute and the smaller ones 1000 cu. ft. A special water gauge is used to indicate the air pressure.

Every bolt and nut machine is driven by an in-

dividual motor, electrical current for power and lighting being furnished from the power-house in connection with the steel plant. The power lines are carried in a tunnel and in conduits under the platforms. Plain squirrel cage motors of the induction type, ranging from 1 to 35 hp., taking 440-volt, 3-phase, 60-cycle current are used to drive all the machines except the continuous headers. There is a separate cutout box for each motor. The motor starters have overload and no voltage release as a safety device to protect the operator, should he put his hands in the machine after it had stopped without first turning off the power and then get them caught as a result of the return of the power and the unexpected starting up of the machine. The motors are set close to the small machines to economize in space and belts. These motors are equipped with belt tightener idler pulleys with spring tension to provide sufficient belt contact on the motor pulleys. The continuous hot heading machines are driven with shifting armature variable-speed direct-current motors with magnetic starters and equipped with overload and no voltage release and push button control. The cranes and telfers are driven by 250-volt direct current.

The shop is lighted with 250-watt tungsten filament lamps with concentrating reflectors. These lamps are spaced 30 ft. lengthways in the plant and 29 ft. 6 in. crossways, being located in the center of the longitudinal and transverse bays, and 30 ft. above the floor level, or 25 ft. above the level of the platforms. For lighting, the 440-volt 3-phase 60-cycle current is reduced by means of three delta connected transformers to 115 volts and the lighting is controlled by two panel boxes. The panel boxes contain 3-phase bus bars, single phase lines being taken alternately from one bar to the other to balance the load, each line controlling 5 lamps. With this arrangement dark spots in the plant are prevented should one of the transformers get out of order. The wire is placed in conduits attached to the roof trusses.

A vacuum return line heating system is used for heating the forge shop and office building. Steam for heating purposes is carried 1100 ft. at 150 lb. pressure from the steel plant boiler house and is reduced to 5 to 10 lb. pressure. The location of a portion of the steam coil radiation is unique. Instead of placing the overhead radiation beneath the windows of the transverse sawtooth roof sections, this radiation is located above the crane runways, as will be noticed in some of the illustrations. This was regarded as a better location for heat efficiency and at the same time the continuous radiation surface, running the length of the two crane runways, serves as a safeguard. Two lines of barb wire are stretched above the coils and the radiators and wires prevent the workmen from stepping from one crane to another and the accompanying danger of injury. Other radiation is located along the side walls beneath the windows. Wall type radiators are used throughout. The heating system is designed to heat the shop to 45 deg. Fahrenheit in zero weather, the additional heat from the furnaces being sufficient to bring the building to the proper temperature. The water discharge from the vacuum pump is into the settling tank previously referred to. The Powers temperature control system is in use in the office building. The hot water supply for the various lavatories is controlled by a Sylphon tank regulator.

Various provisions are made for the convenience and comforts of the employees, including a first aid hospital, bubbling drinking fountains in connection with water coolers, the drinking water supply being sterilized, and sanitary urinals and closets.

Adjoining the forge shop to which it is connected at the north end, as shown in the drawing, is the company's office building, a six-story and basement brick, steel and concrete structure. The first two floors are used for general storeroom purposes, the first floor also being used as a receiving department. All the smaller supplies are kept on shelves and racks with a list at the end of each row indicating the contents and the amount in stock. The third

floor is used for pattern shop and pattern storage. The fourth floor is taken up with the engineering and operating departments and the two upper floors are occupied by the general offices. In the basement is the mechanical equipment for the office building, this including an air washer for purifying the air supplied in the office rooms and refrigerating equipment for adjoining cold storage rooms used in connection with the office employees' dining room.

The Commercial Production of Sound Steel*

A Special Type of Sinkhead Applied to an Inverted Ingot Reduces Segregation and Piping to a Minimum and Produces a Uniform Steel

BY EDWARD F. KENNEY

The writer has been experimenting for some years in the effort to develop some practical means of applying the benefits of the sinkhead to the ordinary methods of steelmaking in commercial use. The principal essentials seem to be:

1. That the ingot be carried through the heating and rolling operations without the necessity of becoming cold.

*From a paper presented at the eighth regular meeting of the American Iron and Steel Institute in New York, May 28, 1915. The author is metallurgical engineer of the Cambria Steel Company, Johnstown, Pa.

2. That sinkheads be of such type that ingots of varying weights can be cast from the same ingot molds.

1. To get the solidity desired it is not necessary that the ingots become cold. There is little to be gained and there are very decided objections to it, chiefly the loss of heat and cost of replenishing it, and the risk of damage to the ingot in reheating. Any betterment in quality obtained in allowing steel to become cold and then reheating through the critical range is much more economically and safely accomplished after the steel is

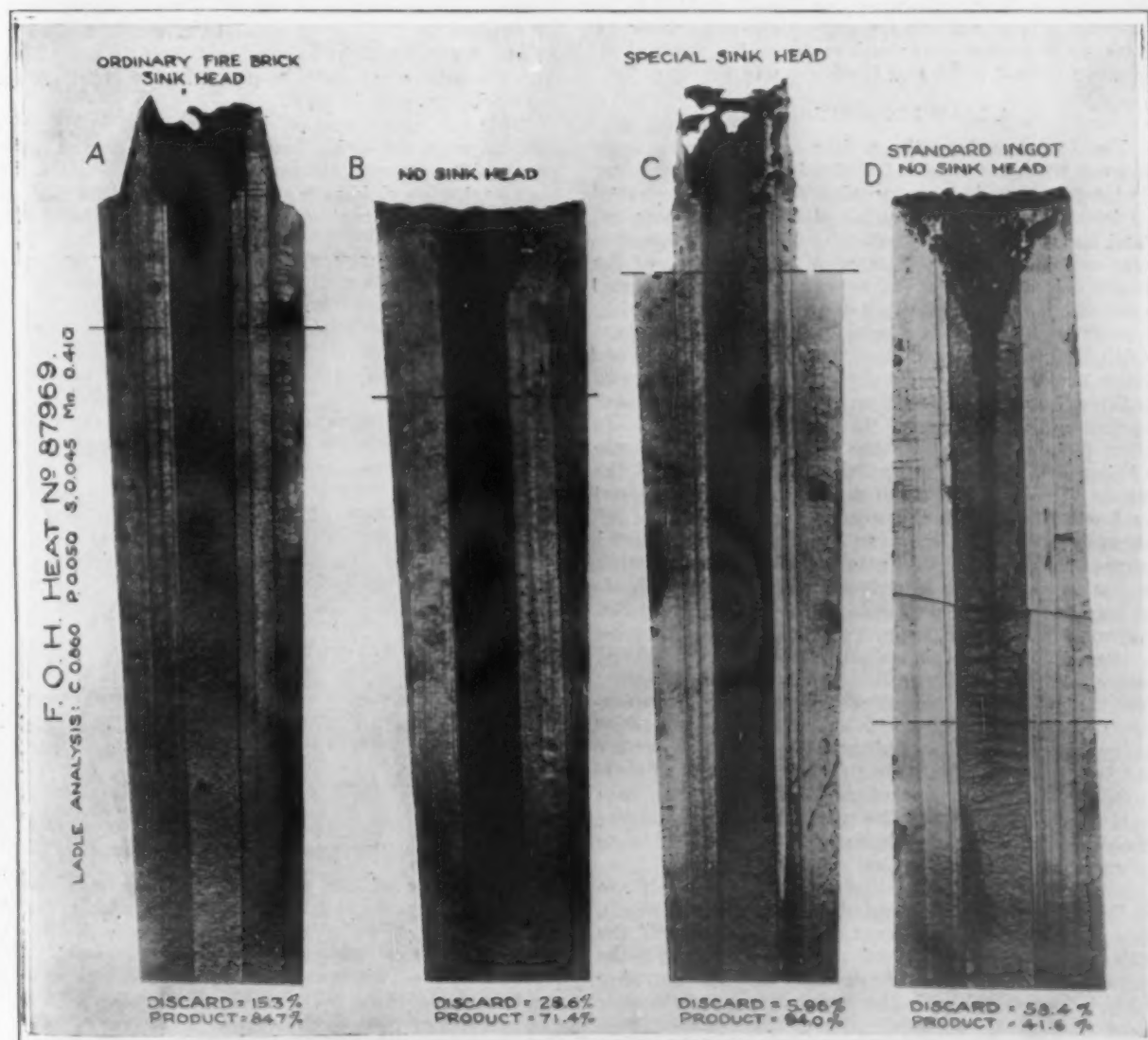


Fig. 1—Comparison of Four Ingots Poured According to Four Different Processes Showing Variation in Segregation

put through the process of rolling into a bloom.

The function of the sinkhead being the preservation of a reservoir of molten metal on top of the ingot until all the body of the ingot has solidified, it follows that the non-conducting jacket should be kept on the top of the ingot when it is charged hot into the pits. The temperature of the soaking pits is lower than the freezing point of the steel, and there would consequently be a loss of heat from the sinkhead even in the pits if there were no protecting jacket. The loss would be much less rapid than in an atmosphere at lower temperature, but the very fact that the ingots solidify throughout while in the pits shows that there is a considerable loss of heat from the molten metal. The proper thermal treatment of high carbon heats involves the use of comparatively cool soaking pits when the ingots are charged. It would be quite possible for the small mass of molten metal comprising the sinkhead, if unprotected, to lose heat to such an extent that it would solidify before the greater volume of the ingot. The value of the sinkhead in this event is gone, as on the further contraction of the liquid metal in the ingot there could be no feeding from the sinkhead which had solidified.

Any large masses of slag-making material are objectionable in the furnaces because of the extra labor involved in keeping the pits clean, and therefore sinkheads of ordinary fire-brick are not as available for use with ingots which are to be handled hot as for ingots which are allowed to become cold. It is true that the ordinary brick tops can be broken off before the ingots are charged, but this involves an additional operation; is objectionable on account of the dirt products, and, in addition, leaves the sinkheads without protection in the pits. Moreover, it must not be done until immediately before the ingot is charged, as the sinkhead cools very rapidly in the air as soon as the covering is removed. If for any unforeseen reason the charging is delayed after such removal, the value of the sinkhead is destroyed, and the ingot will be piped.

A LOAM-LINED SINKHEAD

The loam used by the writer does not have to be removed from the ingot before the latter is charged into the pit furnaces, but can be allowed to remain on until the ingot is bloomed, being so plastic that it does not affect the rolling. The practice used in connection with these sinkheads is as follows: A wooden form of the dimensions of the sinkhead extension desired is placed inside the metal sinkhead casing, leaving a space $2\frac{1}{4}$ in. wide between the form and the casting. This space is filled with moist loam well rammed. The loam and casing are then dried, the drying requiring about two or three hours in a pit oven. A number of wooden pegs around the bottom of the casing prevent the loam lining from slipping from the casing, while the whole is being handled and set on the ingot molds, and the steel is poured in the usual manner. When the metal reaches the sinkhead, the wooden pegs are burned off, releasing the iron casing, so that it can be removed, leaving the loam lining attached to and protecting the sinkhead against heat loss. The iron castings do not leave the open-hearth, being promptly removed and rerammed with fresh loam. The loam lining remains on the ingot until it is rolled, which insures against trouble which would result from delays in charging after the protective covering was removed, or the necessity of banking steel, or any of the many possibilities of commercial steel works' practice, which interfere with the regular routine. In practice, this type of sinkhead, besides being more efficient thermally, has been found much cheaper than the regulation brick, and has possibilities which make it much more applicable to ordinary steel works practice.

In addition to the quality betterments which are possible by the use of inverted ingots with sinkheads, there is possible a very great economy because of the much smaller percentage of metal which has to be cropped from the top, as compared with the cropping which is necessary with the ordinary ingot. This is shown in Fig. 1. Here are the photographs of four ingots, all poured from the same heat of steel under identical conditions. All were allowed to become cold,

and were then slotted about one-third of the way through from either side and broken with wedges. D is an ingot of the ordinary shape; B, an inverted ingot; A, a similar inverted ingot which was equipped with an ordinary fire-clay sinkhead, and C, a similar ingot equipped with the special sinkhead consisting of an iron shell with dried loam lining. The brick sinkhead has not been as large or efficient as desirable, but even it shows marked improvement in the resulting percentage of yield over the plain inverted ingot, and gives several times the yield obtained on the plain ingot. (The steel used in these ingots was thoroughly deoxidized steel, and it approaches the conditions shown as it cools.)

REGULATING THE SIZE OF THE INGOT

2. The value of the sinkhead in getting a large percentage of solid steel from the ingot will be materially reduced unless we can regulate the size of the ingot to produce the amount of metal needed. In ordinary practice today this is easily accomplished by pouring the steel to any desired height in the molds. For instance, in most works producing rails, a single size of ingot mold is used, and ingots to economically produce any weight of rails are cast in the same mold. For 90-lb. rails only about nine-tenths of the amount of metal is poured into a mold which would be poured if the same number of 100-lb. rails were required. Similarly in other products, the weight of the ingot is varied to give the amount of steel required for a given product. Practically all sinkheads used in the past have been so designed that they were set at the top of the ingot mold, and no variation in the weight of the ingot was possible with a given mold. This feature would necessitate an extraordinarily large equipment of molds of various sizes, or else result in the scrapping of considerable quantities of steel. Both of the difficulties will be avoided by the use of a sinkhead which can be set at any desirable height in the ingot mold in accordance with the amount of metal required in the ingot for the particular purpose in view.

This adjustable feature has been tried out in connection with the dried loam sinkheads, and is quite practicable. Several thousand tons of rail ingots have been cast with sinkheads which embodied this feature, the ingots being cast 7 in. shorter than the molds,

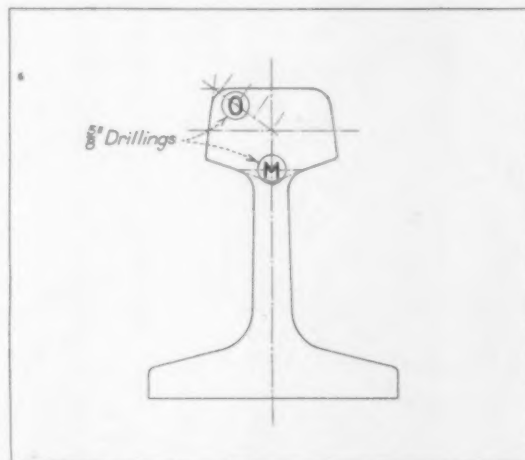


Fig. 2—Diagram of a Rail End Showing Location of Drill Holes for Samples in Accordance with the Pennsylvania Railroad Specifications

thereby making a very considerable saving in the scrap loss.

THE PENNSYLVANIA SPECIFICATIONS

An example of the possibilities in the making of uniform steel in a commercial way is available in the recent rollings of rails for the Pennsylvania Railroad. In 1914 this road issued specifications for steel rails which contained features radically different from any previously published. The most noteworthy of these was a series of tests to determine the degree of segregation as exemplified by carbon. The specifications required drillings for analysis to be taken from two

points; one representing the outside of the head, and the other the junction of the web and head, of a section of rail cut near the top end of the top rail. The content of carbon, phosphorus, silicon and manganese found at the first named point, marked O in Fig. 2, was required to be entirely within the limits specified, and failure to meet this requirement in regard to any one of the elements named rejected the entire heat. If the analysis of the drillings taken from A was found to meet the requirements, drillings from the point marked M on the diagram were analyzed for carbon, and if the carbon content found varied by more than 12 per cent. from that found at O, all the top rails from that heat were rejected. Similar analyses were made of drillings from the B rail, and in the event of the rejection of all the B rails, similar tests were made from the C rails. The failure of the C rail sample rejected the entire heat.

The point O was supposed to be fairly representative of the average of the heat, and the point M, while not being the center of the section nor the point of maximum segregation, was sufficiently near the segregation center to indicate the presence of any strongly marked irregularity in carbon content due to liquation.

The degree of segregation permitted was rather small. The carbon limits prescribed by the specification being 0.60 per cent. to 0.75 per cent., the variation permitted amounted to 0.072 per cent. at the low limit and 0.090 per cent. at the high. The specifications were afterward amended to allow a tolerance of 0.02 per cent. to cover the possibility of variation in chemists' work in the event of one chemist obtaining results within the limits and the other outside.

These limits were very close, and rails which would meet such conditions would undoubtedly be very different from a large portion of the rails accepted under the specifications in common use. To meet the prescribed tests it was generally proposed to discard sufficient of the upper portion of the ingot to insure that the portion used be uniform within the limits required. Different steelmakers estimated that from 25 to 40 per cent. of the ordinary rail ingot would have to be cropped.

TESTS AT TWO LARGE MILLS

Trials of the new specifications were made at two well-known rail mills and resulted in the rejection of considerable percentages of the rails rolled, but no large discards were made from the tops of ingots. The writer suggested that the requirements of the specification could be met more economically by making use of inverted ingots equipped with sinkheads, which would permit the use of steel which by reason of its being thoroughly deoxidized would show little segregation. Such steel could not be safely cast in the type of ingots ordinarily used for rail steel, because of excessive piping, and because the location of the piping cannot be predicted with any degree of certainty.

The results of the different efforts to meet the specifications in various ways are given in the following table:

Cause	Percentage of Rails Rejected							
	Ordinary Ingots		Sinkhead Ingots					
	Mill A	Mill B	Mill A	Mill B	Mill A	Mill B	Mill A	Mill B
1st roll	1.	2d	1st	2d	1st	2d	3d	
Piping	5.30	3.28	4.86	6.26	12.09	8.52	1.76	
Drop test								
breakage	4.54	1.27	0.24	1.17	0.00	0.60	0.00	
Segregation	8.84	16.52	11.40	7.40	0.00	0.00	1.04	
A. O. analysis	20.80	19.81	12.30	3.24	0.00	5.51	0.00	
Total rejections on test	39.48	40.88	28.70	18.07	12.09	14.63	2.80	

Column 1 gives the results obtained on Mill A using their ordinary practice of steel-making and discard. Column 2 covers the second rolling at the same mill.

Column 3 shows the results of the first rolling at Mill B, and 4, the second rolling at Mill B, using a somewhat different practice.

Columns Nos. 5, 6 and 7 cover the different rollings to meet the specification, using inverted ingots equipped with sinkheads.

The two earlier rollings of the sinkhead series were made from ingots equipped with sinkheads too small to

insure all the piping being included in the sinkhead. These small sinkheads were gradually replaced by larger ones, and in the last rolling most of the sinkheads were of the proper size. There is no doubt that with a sinkhead of right size, there will be no question as to the piped rails being entirely eliminated.

DETECTION OF SEGREGATION

These specifications are admirably adapted to detect and penalize segregation. The only guide the rail mill

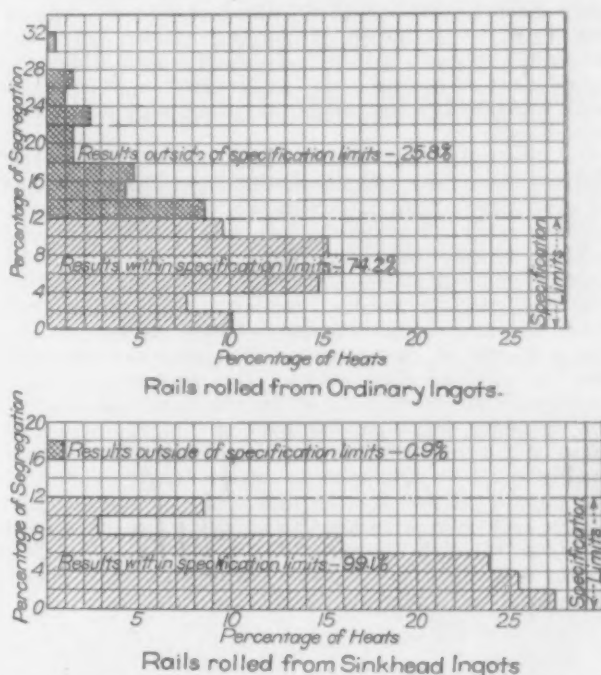


Fig. 3—A Detailed Comparison of Rails Outside and Inside the Pennsylvania Specifications Made from Those Rolled from Ordinary Ingots and Those from Sinkhead Ingots.

has as to the grade of steel in a heat is the ladle analysis. This ordinarily is a fair average of the heat, and if the analysis at the point O corresponds to the ladle analysis, the mill can safely apply steel based on the ladle. If, however, the O analysis does not agree with the ladle, rejection of the entire heat is likely to occur in spite of the ladle analysis being well within the requirements. In thoroughly deoxidized steel the O analysis agrees very closely with the ladle, as there is neither the central enrichment nor the exterior impoverishment. In the results of the early rollings shown in columns 1, 2 and 3, the rejections because of O analyses being outside the limits are greater than those due to segregation at the point M.

The main feature of these specifications centered around the chemical analyses. Using the railroad chemists' results, which must of necessity be considered decisive, the percentage of segregation which was found in the top rails was 9.29 per cent. for rails rolled from ordinary ingots and 4.31 per cent. for rails rolled from sinkhead ingots. There is on the average more than twice as much segregation in the ordinary ingots as in the sinkhead type. A more detailed comparison is given in Fig. 3, which shows how much more uniform the sinkhead ingots were. This diagram shows that 25.4 per cent. of the analyses from heats cast in ordinary ingots were outside the rejection limits, while less than 1 per cent. of the analyses from sinkhead heats were outside. Out of all the 5000 tons of rails made from sinkhead ingots, we found only one case where the segregation was sufficient to cause rejection, and we have reason to think this was due to an error in not following instructions, and not to anything inherent in the method of producing uniform steel.

By taking a large discard from the top of the ingot, fairly uniform steel can be obtained, but this is not economical, nor is it certain, as there are many ingots in which there is segregation and a tendency to pipe, with sometimes actual piping 50 per cent. or more from the top of the ingot. The Pennsylvania specification will not detect defects of this kind, although

it is certain that it will result in a great betterment in the quality of the rails over those purchased under the usual specifications.

These experimental rollings of rails have been selected to show the possibilities of the inverted ingot in making steel commercially which is practically free from aggregation, because the testing was so thorough and so well checked by the purchaser that there can be no question as to the results. Equally striking effects have been produced in the making of forging steels where the necessity of producing sound steel is probably more imperative in a commercial sense than in the rails. The buyer of forging blooms can very economically pay a substantial extra for steel which can be guaranteed as sound, and an inverted ingot equipped with an efficient sinkhead is the surest way to produce such steel.

Splice bars, tank plates, light rails, etc., were frequently made from the top cuts of ingots, and appeared to give satisfaction, but there is a general demand for better quality all along the line, and it is reaching all these products. One of the leading railroads has very recently put out a specification for splice bars in which the requirements are as exacting as for the highest class of heat-treated forgings. These changes in the requirements of customers are changing the economic conditions in the steel works. The gradual and rapid restriction of the uses to which the upper portions of the standard ingot can be used is forcing more and more of the top cuts into the scrap heap. Some cheap method must be developed to make a larger portion of the ingot available for the new and exacting requirements, and so certain are the results which have been obtained through the use of the sinkhead that the writer believes some adaptation of it is the most promising means of achieving the desired result.

A British Protest on Metallographic Nomenclature

Declaring that a recent report, issued from Vienna, Austria, of Committee No. 53 of the International Association for Testing Materials, of which Prof. Henry M. Howe of Columbia University and Prof. Albert Souveur of Harvard University are chairman and secretary respectively, on "The Nomenclature of the Microscopic Substances and Structures of Steel and Cast Iron," is a "deliberate attack by American metallurgists, under Austrian auspices, on Sheffield micrographic nomenclature," Prof. J. O. Arnold, of the University of Sheffield, England, in a communication to the Engineer, London, advises British steel metallurgists to ignore it. Professor Arnold claims that, though two Englishmen, Dr. W. Rosenhain and Dr. J. E. Stead, are on the committee, Sheffield, "the hub of the world, the home of microscopic analysis and of the greatest naval armory the world has ever seen," is not represented, and he therefore states that he will resign from the "so-called" International Association. "The Rip Van Winkle nature of this pamphlet," says Professor Arnold, "may be judged by the fact that Beta iron, which with much satisfaction Sir Robert Hadfield and I helped to bury at the meeting of the Iron and Steel Institute in London about two years ago, is assumed to be still alive. The fact that in Sheffield University it has been proved that there are three distinct types of steel, each with its own particular set of micro-constituents, that is, iron-steel, vanadium-steel and tungsten-steel, is ignored."

Later, in an issue of Engineering, London, Doctor Stead answers Professor Arnold, saying in part that as he did not join the International Association until 18 months after the selection of the committee he was not qualified for election; otherwise he would undoubtedly have been a representative. The report objected to is not a recent production, but is an excerpt from Volume II of the Proceedings containing the official records of the New York Congress of 1912, circulated to all members in August, 1912, or nine months before Sir Robert Hadfield and Professor Arnold "helped to bury Beta iron."

METAL-WORKING MACHINERY

April Exports Show \$2,000,000 Increase or 150 Per Cent.

WASHINGTON, D. C., June 15, 1915.—Exports of metal-working machinery, including machine tools, increased in value more than 150 per cent. during April, 1915, and more than 45 per cent. for the ten months ending with April, compared with corresponding periods of 1914, according to statistics just compiled by the Bureau of Foreign and Domestic Commerce. The total exports of machinery of all kinds, however, gained but 2 per cent. in April, 1915, over the same month a year ago, while for the ten months ending with April there was a net loss of no less than 24 per cent. These figures reflect faithfully conditions due to the war and prove that while American manufacturers of machinery in certain lines are reaping a harvest as a result of the great conflict, the trade at large is suffering from a period of depression in both export and domestic branches. The total domestic exports for the ten months ended with April are shown in the following table:

Exports	10 months ending with April	
	1914	1915
Crude materials for use in manufacturing	\$772,056,256	\$434,620,120
Foodstuffs in crude condition, and food animals.....	116,330,048	442,357,414
Foodstuffs partly or wholly manufactured	252,653,062	365,544,753
Manufactures for further use in manufacturing	312,500,818	280,343,971
Manufactures ready for consumption	608,305,040	600,711,511
Miscellaneous	6,240,623	59,119,423
Total domestic exports.....	\$2,018,085,847	\$2,182,697,192

In preparing these figures for publication the bureau for the first time frankly admits that "analysis of the above figures for ten months shows that despite the so-called war orders the exports of manufactures of all kinds other than foodstuffs have been less than in the similar period before the war; the normal sales of manufactures during peace were greater than those under existing conditions." This statement is specially interesting in view of the systematic efforts which have been made to create the impression that the increase in our exports, which for the ten months ending with April amounts to approximately 8 per cent., is an indication of general prosperity.

MACHINERY INCREASE SIGNIFICANT

The figures relating to exports of machinery bear out the bureau's statement very significantly. The total shipments in April aggregated \$9,972,050, as compared with \$9,757,471 during the same month a year ago. But for the increase in the exports of metal-working machinery during the month, however, there would have been a loss in the total of approximately 20 per cent. instead of a gain of 2 per cent. For the ten months ending April 30 of the current year the exports of machinery aggregated in value \$73,750,761, as compared with \$96,673,487 for the corresponding period a year ago. But for a \$9,000,000 increase in the exports of metal-working machinery the decrease during the ten months of the current fiscal year would have amounted to 33 per cent. Aside from metal-working machinery only three items showed an increase: stationary gas engines, 12 per cent.; paper-mill machinery, 7 per cent., and flour and grist mill machinery, 4 per cent. Heavy declines in exports are noted in cash registers, elevator machinery, steam engines, printing presses, pumps and pumping machinery, refrigerating machinery, sewing machines, shoe machinery, typesetting and typewriting machines and wood-working machinery.

METAL-WORKING MACHINES INCREASE \$9,000,000

Exports during April of the current year showing, as they do, a slight gain compared with the same month of 1914, although composed to the extent of 33 per cent. of metal-working machinery, emphasize an upward tendency which began several months ago and which promises to reduce materially the disparity between the total shipments for the two full fiscal years. Increases

were recorded in April of the present year in twelve items as against four items for the ten months' period. The following table shows in detail the exports of machinery for April, 1914, and 1915, and for the ten months ending April of the two years:

	April		Ten months ending April	
	1914	1915	1914	1915
Adding machines	\$172,766	\$32,715	\$1,385,426	\$379,369
Air-compressing machinery	59,595	32,668	481,023	308,588
Brewers' machinery	28,852	5,862	296,018	99,061
Cash registers	474,264	86,210	4,074,467	1,132,051
Parts of	a	7,641	a	90,075
Cotton gins	5,572	2,251	138,453	35,005
Cream separators	27,549	28,880	298,215	155,811
Elevators and elevator machinery	108,402	70,549	1,106,200	685,771
Electric locomotives	90,287	.....	272,387	249,096
Gas engines, stationary	57,142	41,234	330,952	370,795
Gasoline engines	557,620	521,051	5,394,595	3,909,761
Steam engines	412,765	286,461	4,660,767	2,156,838
All other engines	40,928	135,415	822,365	658,174
Parts of	289,656	375,967	2,877,856	2,207,138
Laundry machinery, power	45,518	42,851	424,105	231,801
All other	45,504	17,262	487,016	184,581
Lawn mowers	36,412	39,382	330,210	243,118
Metal-working machinery (including metal-working tools)	1,308,821	3,300,953	11,695,959	20,664,839
Meters, gas and water	b	24,756	b	254,910
Milling machinery (flour and grist)	53,299	296,912	960,927	1,000,376
Mining machinery	596,144	.....	8,134,072	.....
Oil machinery	.....	103,625	.....	1,761,530
All other	.....	470,321	.....	3,570,470
Paper-mill machinery	62,021	79,120	566,345	607,011
Printing presses	267,561	105,207	2,139,339	1,152,179
Pumps and pumping machinery	277,187	203,862	3,084,540	2,008,784
Refrigerating and ice making machinery	86,820	163,947	827,369	502,723
Sewing machines	969,474	518,529	9,505,022	5,089,533
Shoe machinery	108,174	144,950	1,311,188	980,758
Sugar-mill machinery	70,196	199,401	2,246,917	1,784,194
Textile machinery	86,199	113,844	1,371,516	1,242,988
Typesetting machines	208,004	46,099	1,690,634	630,697
Typewriting machines	994,145	566,175	8,844,439	3,982,913
Windmills	141,066	68,685	1,414,715	562,285
Wood-working machinery, sawmill	39,439	28,597	509,308	202,912
All other	96,458	83,370	1,115,246	526,470
All other machinery and parts of	1,942,631	2,196,198	17,875,796	14,127,841
Total	\$9,757,471	\$9,972,050	\$96,673,487	\$73,750,761

a Included in cash registers in 1914.

b Included in all other machinery in 1914.

Changes in classification explain several apparent discrepancies in the above table. In 1914 cash registers and parts of were reported in a single item; gas and water meters were returned with all other machinery and the item of mining machinery covered that employed in drilling oil wells as well as all other kinds.

SHRAPNEL IN THE STATISTICS

The statistics covering the exports in general iron and steel products for April are not yet available, but a careful canvass of the principal ports of exit, made by the officials of the Bureau of Foreign and Domestic Commerce, has provided the solution of a problem that has perplexed many persons familiar with the recent trend of war orders. For a number of months large quantities of bars are known to have been sold to manufacturers for the production of shrapnel for export, but the official statistics have been scanned in vain for a heading that might reasonably be expected to cover this article. The bureau is now advised that all shrapnel exported in loaded condition has been classified with explosives, whereas all shipped unloaded has been included in the basket category of "all other manufactures of iron and steel."

This classification has been suspected, but the very moderate figures covering miscellaneous exports of iron and steel have seemed to indicate that shrapnel could

hardly be included therein. The explanation of the customs officials is that since the beginning of the war the shipments of miscellaneous iron and steel manufactures, except shrapnel, have been very small. Analyzing the figures for the nine months ending March of the current year, it appears that while there was a reduction in the total exports of iron and steel articles of 25 per cent., the decline in unenumerated manufactures was only 15 per cent. For the same period an increase in exports of explosives of more than 200 per cent. was noted, about one-third of the total being unenumerated and presumably consisting largely of shrapnel.

W. L. C.

Canadian Industrial Notes

Thomas Cantley, vice-president and general manager of the Nova Scotia Steel & Coal Company, New Glasgow, N. S., has secured a contract from the Russian Government for the manufacture of 2000 large freight cars. He further confirms the report that Canada is securing a large amount of business that was formerly in German hands. His company is undertaking heavy machine forgings for the Clyde formerly done by German manufacturers.

The Dominion Steel Corporation, Sydney, N. S., is now operating to 90 per cent. of its capacity, and, according to President Plummer, orders booked insure continued operations to this extent for another four months. The business, being almost entirely of an export character, is not proving as profitable as domestic orders. The company's output for April was as follows, compared with the same month last year, in gross tons:

	April, 1915	April, 1914
Pig iron	23,000	21,216
Steel ingots	27,450	28,718
Rolls	839	16,475
Wire rods	5,636	5,042
Bars	1,375	2,407
Wire and wire products	3,237	2,247
Coal	472,284	438,890

The Crow's Nest Pass Coal Company will build a modern by-product coke oven plant. Elias Rogers, Toronto, Can., president of the company, states that the plant will cost between \$500,000 and \$1,000,000. The foundations for the ovens will be put in this fall and the plant will be ready for operation next spring. The by-products to be turned out will include sulphate of ammonia, ammoniacal liquor, benzol and tar.

The applied science department of McGill University, Montreal, Que., has turned over its mechanical equipment for the manufacture of shell tools. It is reported that other Canadian universities will follow McGill's example.

Birmingham Sentiment on the Steel Suit

Resolutions expressing the opinion that no good can come of further prosecution of the Steel Corporation have been sent to President Wilson by the Birmingham, Ala., Chamber of Commerce. Copies were sent also to Secretary Goodwin of the National Chamber of Commerce with the request that he bring this memorandum to the attention of other members of the national organization. Characterizing the methods of the Steel Corporation, the resolutions say: "Its attitude, both to its competitors and to its employees, has been characterized by an unusual spirit of fairness, of equity and of liberality. It has been a pioneer in establishing cordial and friendly relations with its employees and it has treated them with a spirit of equity and justice. Our experience has led us to believe that it has always been within the spirit, and we are glad now to be assured by the unanimous findings of the court that it is within the letter of the law. We believe that no good result can come from a further prolongation of the litigation in this cause and we sincerely hope that the President of the United States, in whose wisdom and patriotism we have every confidence, can see his way clear as a matter of broad public policy to cause the litigation to end with the decision of the court of appeals."

A Works Store Operated at a Profit

Conducted by the Employer's Benevolent Association of the Pierce-Arrow Motor Car Company
—The Money Made Devoted to Welfare Work

A plant store that is of unusual interest, because of the volume of business that it does and the methods of its operation, is conducted in the automobile plant of the Pierce-Arrow Motor Car Company, Buffalo, N. Y., by the Pierce-Arrow Employer's Benevolent Association. This store does a business of approximately \$50,000 per annum among 4600 men now on the company's payroll.

Unlike most factory stores conducted under the direction of employers, that buy various household necessities in round lots and sell them to employees at approximately cost in order to cut the high cost of living, this store is run at a profit. From the sales the profits amount to about \$1000 per month and go into the fund of the Benevolent Association. Employees pay about the usual market price for everything they purchase at the store, so that they do not make a direct saving by patronizing it, but they are benefited indirectly by helping to increase the fund from which they will receive assistance when, because of sickness or other causes, they are in need of help.

The store is conducted by the Benevolent Association with the co-operation of the company, which furnishes space for this purpose in the basement of the main office building. This store is well arranged with show cases and shelves and there is a sufficient volume of business to require the services of three salesmen. Office men patronize

the store during office hours and, while men from the plant are allowed to make purchases at the store during working hours, this is not encouraged. To supply the wants of the men three trucks or push carts, one of which is shown in an illustration, are sent around through the shops over regular routes twice a day. The goods carried at the store and on the push carts include cigars, tobacco, con-

fectionery, notions, emergency bicycle supplies and bakery and canned goods which the men buy for their lunches. In addition there is carried at the store quite a complete line of various sundries; soft drinks are sold and orders are taken for coal. Express money orders are sold, and gas bills are paid.

The operation of the store is regarded with much favor by the company for the reason that, aside from the money made for the benevolent work among the employees, it creates a more cheerful atmosphere around the plant and it is believed to promote greater efficiency among the men.



One of the Trucks or Push Carts Sent Through the Plant to Carry Articles from the Store to the Employees

So far as is known, says the Connellsville Courier, the first American coke to be shipped to South America will be an official order of 4500 tons from the Consolidated Connellsville Coke Company to the Argentine Republic, to go from Baltimore. It is a trial order and the success of the experiment with it will determine whether there will be more orders.



The Plant Store of the Pierce-Arrow Motor Car Company Conducted by the Employer's Benevolent Association

Waste-Heat Boilers in Steel Plants*

Representative Open-Hearth Installations—Operating Results in the Chicago District—Possibilities of Further Saving

BY C. J. BACON



C. J. BACON

Existing boilers on large open-hearth furnaces are showing a saving which, when expressed in terms of fuel required in coal-fired boilers, is equivalent to at least 250 lb. of coal (11,000 B.t.u. per lb.) per ton of ingots. From statistics of this Institute, the amount of open-hearth steel produced in 1913 in the United States was approximately 27,000,000 gross tons. As the majority of the furnaces are over 50 tons capacity, it may be stated conservatively that the use of boilers would result in saving between 150 and 200 lb. of a medium grade of coal per

ton on this total production of ingots. The annual saving would thus be at least 2,000,000 tons of coal—certainly an ample inducement for widespread adoption of this form of improvement.

Recent activity in this direction at several steel plants is seen to be fully justified when it is recalled that 45 per cent. of the total heat delivered to the open-hearth as fuel gas and combustible elements of the charge is wasted to the stack, and that one-half or two-thirds of this loss may be recovered by boilers at 60 per cent. or greater return on the investment. The heat thus saved is in the form of steam, and it is customary to express this saving in terms of the coal required in a boiler-house for generating the same amount of steam.

While the use of boilers in such applications as soaking pits and heating furnaces of regenerative type has not received a proportionate share of attention, yet the waste gas conditions are, or may be made, as promising for the generation of steam as in open-hearths. Generally speaking, a suitable boiler on any type of regenerative furnace will prove a paying investment, provided precaution be taken to minimize the wasteful and unnecessary cooling of the gas through infiltration of air and dissipation of heat.

The object of this paper is to describe briefly some of the representative open-hearth boilers, and to point out such results and operating experiences as may be indicative of savings elsewhere and helpful in future installations.

SOME EXISTING BOILERS ON OPEN-HEARTH FURNACES

The first installation of an open-hearth boiler was made in 1910 on a 65-ton furnace at the South Chicago works of the Illinois Steel Company. Preliminary tests and calculations indicated that at least 60,000 lb. of gas per hour at a temperature of 1200 deg. F. was escaping up the stack, and from these conditions it was estimated that the probable gross available output would

be 175 boiler horsepower. As little was known of the requirements for this new service, a second-hand Heine water-tube boiler of the usual horizontal type, having 1900 sq. ft. of effective heating surface, was installed.

After the boiler was put in service, in February, 1910, and desired adjustments made, a test of a month's duration showed a gross output of 190 boiler horsepower during furnace heats, with gas at an initial temperature of 1150 deg. Approximately 30 boiler horsepower was required for the engine-driven fan, the exhaust from which was not recovered. Although these results were far from ideal, they were indicative of considerable economy in a comparatively unexplored region of open-hearth practice. It was evident that boilers with twice this amount of surface would be none too large for furnaces making 72-ton heats, consequently the following year two more boilers of larger size were installed in the same open-hearth plant.

A special type of Stirling water-tube boiler was selected, known as "Class P-30," having 4000 sq. ft. of evaporating surface, but requiring relatively low head room, thereby permitting location entirely under the charging floor. A series of 77 tests, each of the duration of an open-hearth heat, was made on these Stirling boilers with varying temperatures and quantities of waste gases. In the following table are given the average results of ten tests with normal gas conditions:

Total duration of 10 tests.....	78.5 hr.
Output of boiler and superheater.....	334.5 boiler hp.
Feed-water temperature	60 deg. F.
Steam pressure.....	123.3 lb. gauge
Superheat	128.2 deg. F.
Inlet gas temperature	1,227.0 deg. F.
Outlet gas temperature	621.0 deg. F.
Weight of gases entering boiler.....	73,000 lb. per hr.
Heat absorbed by boiler per hr.....	11,200,000 B.t.u.
Heat absorbed by boiler per ton ingots.....	1,575,000 B.t.u.
Draft loss through boiler	1.78 in. water
Rate of heat transfer, 5.08 B.t.u. per hr. per sq. ft. heating surface, per degree mean temperature difference between gas and steam.	

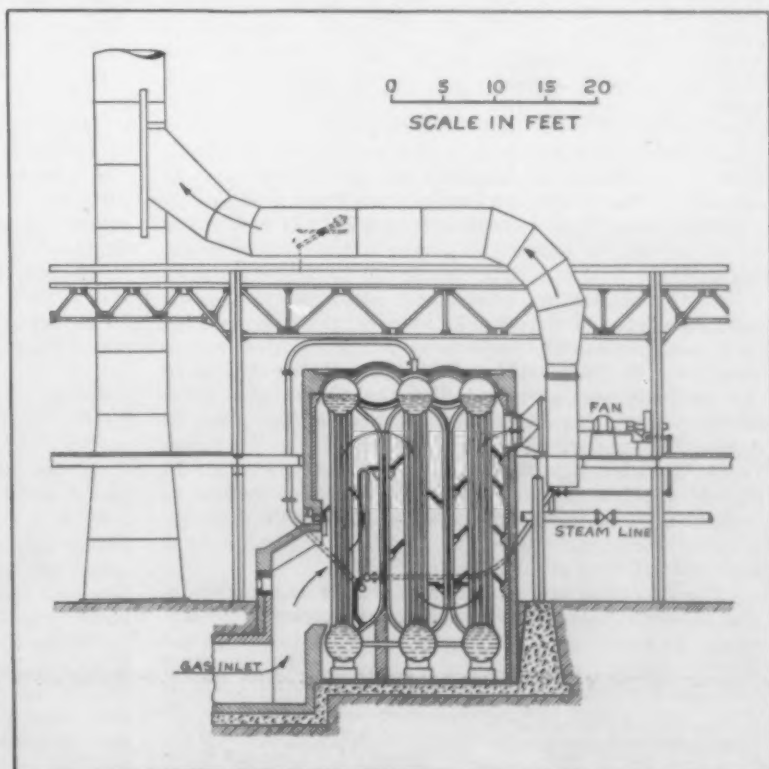


Fig. 1—Installation of Rust Vertical Boilers Under the Charging Floor of an Open-Hearth Furnace at a Plant in the Chicago District

*From a paper presented at the eighth annual meeting of the American Iron and Steel Institute in New York May 28, 1915. The author is steam engineer Illinois Steel Company, South Chicago, Ill.

It will be seen that an average of 335 boiler horsepower was obtained during heats when all the gas from the furnaces, or 73,000 lb. per hr., was passing through the boiler, and that the temperature was reduced from 1227 deg. at the inlet to 621 deg. at the outlet.

Those two Stirling boilers, as well as the previously installed Heine boiler, have been in almost uninterrupted service since their installation, and recording instruments show an average output over long periods of time of about 280 boiler horsepower for each boiler, in addition to 25 horsepower due to the effect of heating the feed-water on the gas valves.

RESULTS AT ANOTHER PLANT

Following the investigations at South Chicago, 28 boilers were installed at another plant where the furnaces are of 85 tons rated capacity. As there was not sufficient room under the charging floor, Rust vertical boilers, each having 4880 sq. ft. of heating surface, were installed, as shown by Fig. 1.

In this installation the fans, which have 90-in. diameter wheels, of special proportions to suit the high draft and temperature conditions, are driven by steam turbines, the exhaust of which is utilized in a central feed-heating system, so that the net cost of fan operation is very low, being only seven boiler horsepower, or less than two per cent. of the gross output of the boiler. After various changes the following continuous test was made, representing average conditions during heats:

Duration	152.2 hr.
Output of boiler and superheater.....	393 boiler hp.
Steam consumed by fan turbine.....	60 boiler hp.
Steam returned to feed-water heaters.....	53 boiler hp.
Net output of boiler.....	386 boiler hp.
Steam pressure	126.1 lb. gauge
Temperature of superheated steam.....	530.8 deg. F.
Inlet gas temperature.....	1,155 deg. F.
Weight of gases entering boiler.....	83,434 lb. per hr.
Heat absorbed by boiler per hr.....	13,200,000 B.t.u.
Heat absorbed by boiler per ton ingots.....	1,840,000 B.t.u.
Draft loss through boiler.....	2.48 in. water
Rate of heat transfer.....	6.92 B.t.u.

While these test results show that the average evaporation is 393 boiler horsepower during heats, 350 hp. may be safely counted on for a year's average. The effect on open-hearth practice, as a rule, has been to materially reduce the time per heat.

BOILERS OUTSIDE THE OPEN-HEARTH BUILDING

Another installation of a single boiler is as shown on Fig. 2. This boiler deserves particular reference on account of the very high evaporation from a relatively small furnace of 30 tons rated capacity. It was found advantageous to locate the boilers entirely outside the open-hearth building, whereas in all installations elsewhere the boilers had been put under the open-hearth building between the stacks, where the construction cost was necessarily considerably higher, due to obstructions and alterations. So encouraging has been the performance of this boiler that steps are being taken to equip the remaining furnaces of the plant in a similar manner. The boiler is the B. & W. cross-drum type, having 2605 sq. ft. of heating surface in 162 4-in. tubes, divided into three vertical passes so that the gases pass transversely across the approximately horizontal tubes, a condition favorable to a high rate of heat transmission.

The following test of 120 hr. duration is representative of average conditions while making steel:

Output of boiler.....	200.2 boiler hp.
Steam pressure	115.4 lb. gauge
Feed temperature	49.6 deg. F.
Inlet gas temperature.....	1,153.0 deg. F.
Outlet gas temperature.....	479.0 deg. F.
Weight of gases to boiler.....	41,470 lb. per hr.
Heat absorbed by boiler per hr.....	6,700,000 B.t.u.
Heat absorbed by boiler per ton ingots.....	2,220,000 B.t.u.
Draft loss through boiler.....	1.92 in. water
Rate of heat transfer.....	6.86 B.t.u.

Although this test shows 200 boiler horsepower, a fair estimate of the average output over long periods is 170 to 175 hp. without deducting the steam required for driving the fan engine, which in this instance is a considerable amount, since there is no means of recovering the heat in the exhaust. In this case, as in others, there was an apparent reduction in the time required per heat. In addition to the boilers above described, several other installations have been made in various large plants.

With this above brief account of progress in some of the representative installations, it is opportune to draw some conclusions from the economical performance of present boilers, to outline the possibilities, discuss the operating difficulties, and direct attention to the avenues leading to further progress in design and operation.

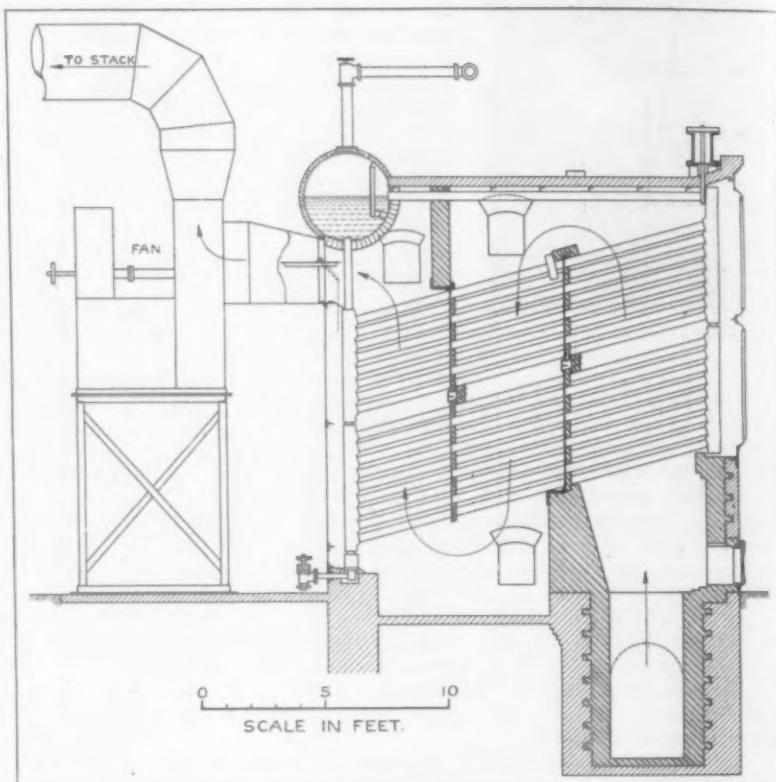


Fig. 2—Installation of a Single Boiler Outside the Open-Hearth Building of a Steel Plant in the Chicago District

SAVINGS EFFECTED

Experience with existing boilers has shown that the heat recovered is about 22 per cent. of the heat in the coal charged to the producers, or about 1,600,000 to 2,200,000 B.t.u. per ton of ingots. In terms of coal containing about 11,000 B.t.u., this is equivalent to an average of 180 lb. per ton of ingots. It must be remembered, however, that this heat is in the form of steam which, if generated in coal-fired boilers at 60 to 70 per cent. efficiency, would require 250 to 300 lb. of coal. Other approximate statements of the saving are:

1600 to 2000 lb. steam per ton of ingots.
65 to 90 boiler horsepower per 1000 tons of ingots per month.
65 to 90 boiler horsepower per 1000 lb. of coal per hr.

If the open-hearth fuel were natural gas, the boilers would generate about 85 per cent. as much steam as with coal, due to less weight of products of combustion. Pittsburgh coal gives about 25 per cent. more waste gases per pound than Illinois coal, but on account of less coal consumed per ton of ingots only slightly more steam would be generated.

While the results of tests given in the above description of boiler installations show the output in terms of "Boiler horsepower" during heats, the average output over long periods, including average delays, Sundays, etc., appears to be from 80 to 85 per cent. of the test results.

In regard to the effect of boilers on the production

of steel (it may be said that when the furnace is new the time required for heat does not appear to be affected to any marked extent, but as the furnace becomes old and the checkers fill up, the influence of the boilers becomes more evident, due to better and more uniform draft from the fans that draw the gases through the boilers.

OPERATING DIFFICULTIES

Leakage of Air.—Air leakage through the brick settings of water-tube boilers is the source of appreciable

the necessity of applying large steam or motor driven fans. Some waste-heat boiler installations are being built during the construction of new open-hearth plants, and therefore should show a considerably reduced cost.

Weight of Waste Gas to Boiler.—The weight of gases from open-hearth and other furnaces is very difficult to determine. Accurate direct measurement is out of the question, due to lack of suitable conditions for use of meters. The weights mentioned above in the test results were calculated on the basis that total heat absorbed in the boilers requires a certain amount of gas

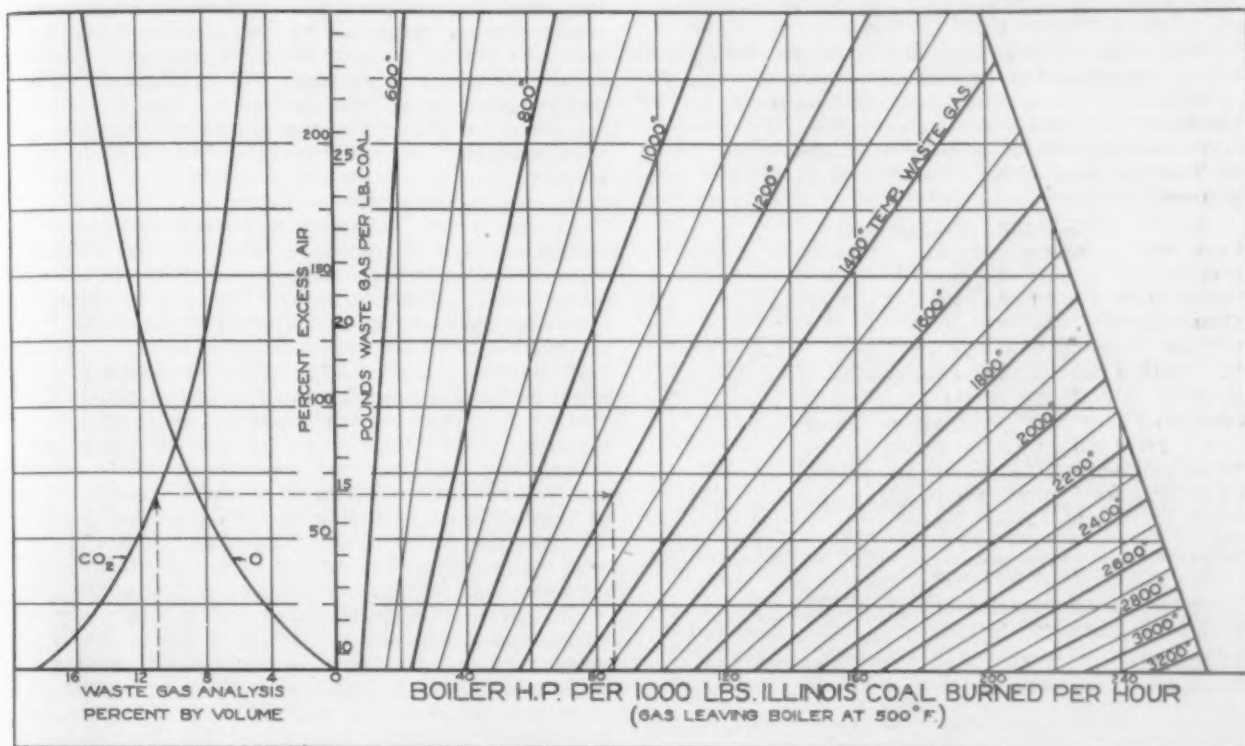


Fig. 3—Chart Giving the Boiler Horsepower Available from Waste Gases

loss in efficiency, and the most attentive efforts to keeping the settings tight by pointing the brickwork and application of various paints and cements have not been entirely successful. Reports from all the existing installations speak emphatically on this point, and although in some instances excessive leakage has been temporarily overcome, nevertheless the liability of explosions in the flues, boilers and flues leading thereto demands constant attention, since the explosions loosen the brickwork of the boiler settings, not only increasing the air leakage, but incurring a high expense for repairs. These explosions are characteristic of open-hearth operation, being due to the escape of producer gas into the flues during the reversal of the gas valves, but may be somewhat reduced by close attention to manner of reversing.

Dust.—The dust coming from the open-hearth furnaces and checker chambers is in an exceedingly fine and adherent condition and packs closely onto the boiler tubes, as well as on baffles and projections. There appears to be no means of preventing the dust entering the boilers, consequently the only remedy so far applied is frequent blowing with steam by portable and permanent soot-blowers. As a rule, blowing at intervals of six hours has been found sufficient, if the operation be thoroughly performed, but after the dust has been allowed to remain it has a tendency to form a scale which is more difficult to dislodge than the freshly deposited dust. The practice is also to give them as thorough a sweeping as possible when out of service.

Cost of Installation.—The cost of installation is about 25 per cent. higher than for ordinary coal-fired boilers, in spite of the elimination of coal and ash handling equipment, stokers, etc., and this is due to the abnormal expense of construction work performed on isolated waste-heat units in cramped quarters, changes to buildings, underground flues and foundations, and to

to be cooled between the initial and final temperatures. Radiation from the setting is small and not considered. This method is subject to serious error, due to uncertainty as to the specific heat of gases at these temperatures, and more particularly to the difficulty of obtaining representative temperature readings and gas analyses used in determining the amount of air leakage. Determining the weight of gas from the combustion of the fuel and elements in the charge would be a better method if the rate of fuel consumption during tests were accurately known, but this method also is affected by the accuracy of gas sampling. On account of this uncertainty, ample allowances should be made in the design of boilers, flues and fans. Air leakage has a serious effect on boiler output and fan work and should be eliminated by air-tight steel casings around the boiler settings when the water-tube boilers are used.

Fig. 3, giving the boiler horsepower available from waste gases, may be found useful in making quick determinations of amount of heat recoverable as steam. Although intended for Illinois lump coal the diagram may be used for Pittsburgh run-of-mine by adding 25 per cent. to the results. If the open-hearth charge is about 65 per cent. pig iron, a further increase of 17 per cent. should be allowed for the additional gases formed by combustion of elements in the charge.

POSSIBILITIES OF FURTHER SAVINGS

While the savings herein pointed out represent a marked economy in open-hearth practice, still there is opportunity for improvement in new installations by means of larger boilers and more attention to reducing the heat losses resulting from air leakage and radiation in the regenerative chambers, valves and flues.

In the table some figures are given showing what proportion of the heat delivered to the furnace may be utilized in a waste-heat boiler. This is based on re-

ducing the gas temperature from 1200 deg. at the inlet to 500 deg. at the outlet, and is the minimum performance that should be striven for. Although present boilers are showing very creditable savings, the outlet temperatures, neglecting the cooling effect of air leakage, are 600 deg. or higher, but the majority of these boilers are so situated that larger boilers could not be readily used.

Wherever space permits, the aim should be to reduce the temperature even as low as 400 deg., where would be realized the maximum net saving per ton of steel, although not necessarily the maximum return on the investment. The size of boiler required for reducing the temperature from 1200 to 400 deg. is two and one-half times the size for reducing to 600 deg., yet at not a proportionately greater investment.

The initial gas temperature also demands further attention. Whereas now the average is not over 1150 deg. for open-hearth furnaces in general, there is no question that it can be increased to at least 1400 deg. One source of loss is the practice of water-cooling

Heat balance of open-hearth furnace

	B.t.u. per hour	B.t.u. per ton ingots	Per cent. of heat in coal	Per cent. of heat in fuel gas	Per cent. of heat to furnace
Coal to gas producers.....	52,500,000	7,000,000	100.0	.....	.....
Producer loss.....	8,620,000	1,150,000	16.4	.....	.....
<i>Heat delivered to furnace</i>					
Gas from producers.....	43,890,000	5,850,000	83.6	100.0	.....
Combustion of C, Si and Mn in charge..	9,370,000	1,250,000	17.8	21.4	.....
Sensible heat of hot metal.....	3,450,000	460,000	6.6	7.9	.....
Total heat to furnace except regenerated gas and a.r.....	56,710,000	7,560,000	108.0	129.3	100.0
<i>Distribution of heat</i>					
Consumed in furnace and losses.....	31,450,000	4,192,000	59.9	71.8	55.5
Utilized in boiler.....	15,510,000	2,068,000	29.5	35.3	27.3
Wasted to stack at 500 deg. F.....	9,750,000	1,300,000	18.6	22.2	17.2
Total.....	56,710,000	7,560,000	108.0	129.3	100.0

These results are based on the following empirical data: Size of heats, 75 tons. Time per heat, 10 hours. Hot metal in charge, 64 per cent. Ratio, product to charge, 88 per cent. Fuel consumption, 4875 lb. per hr., or 650 lb. per ton. Heat value of coal, 10,700 B.t.u. per lb. Weight waste gases at boiler, 81,400 lb. per hr. CO₂ in waste gases at boiler, 12 per cent. Temperature waste gases at boiler inlet, 1200 deg. F. Temperature waste gases to stack, 500 deg. F. Performance of boiler under above conditions, 460 boiler hp.

the gas and air valves. Although not detrimental in ordinary open-hearth practice, this results in a considerable loss when the recovery of waste heat is attempted. The heat thus lost may be recovered either by utilizing the cooling water for feeding the boiler or by substitution of brick-lined gas valves, thereby giving the waste gases a higher temperature on entering the boiler.

The recovery of heat in the waste gases from regenerative soaking pits and heating furnaces presents additional encouraging possibilities, but as a primary consideration, means must be adopted for greatly reducing the heat losses, and excessive air leakage which appears to be characteristic of these types of furnaces. Even if the gas temperature be considerably lower than in open-hearth practice, boilers will be found a paying investment; and heat recovery, by this means, does not cease to be economical until the temperature, at the boiler inlet, is as low as 700 deg.

Ewald Iron Company's New Owners

R. Baylor Hickman, Lawrence Jones and A. T. Hert, who recently purchased control of the stock of the Ewald Iron Company, Louisville, Ky., have organized the Ewald Iron Company, with \$1,500,000 capital stock, under the laws of Delaware. Mr. Hickman is president, Mr. Hert vice-president, and Mr. Jones chairman of the board. Mr. Hickman has decided to devote all his time to the company, and has given up active connection with Hickman, Williams & Co., though retaining his interest. The Louisville office of Hickman, Williams & Co. is now in charge of Frank A. Botts. The Ewald Iron Company's plant, Mr. Hickman states, will be considerably enlarged, but detailed plans have not yet been formulated.

Pipe Couplings for Natural Gas

In a paper before the Mechanical Section of the Engineers' Society of Western Pennsylvania, on the subject of "Pipe Couplings," June 1, R. S. Lord, vice-president Hope Engineering & Supply Company, Pittsburgh, said in part:

The essentials of a good pipe coupling are tightness, flexibility, allowance of expansion and contraction, strength and rigidity. The order in which these essentials rank is not always the same, since for some classes of service great strength might be more important than absolute tightness. The degree of flexibility required varies with the service. Natural gas lines laid over Pennsylvania or West Virginia hills must be capable of bending readily, while artificial gas lines laid to grade need little flexibility. The freedom of expansion or contraction is a very important feature, since without it serious breakage must often occur in spite of deep and expensive covering as a protection from varying temperatures.

In the matter of strength, present day demands require a very high standard. Artificial gas lines use what are called high pressures, but their range is never up to 100 lb. Natural gas pipe lines are laid in small sizes near the wells to control pressure up to the limit of the rock pressures which, in rare cases, run up to 1200 or even 1400 lb. The small lines carrying such pressures to the nearest gate or reducing station hold against breakage very successfully, but the frosty couplings show clearly the expansion of leaking gas. Fortunately, these extreme pressures are never carried any distance from the well, or operated for any length of time without natural reduction, due to expansion into the large space of a big pipe line. The well shut in is the only one showing full rock pressure to strain the joints, and that only on the piping in or at the well.

Main lines of large sizes are now in fairly common use, carrying pressures up to 350 or 400 lb., and it is necessary that such joints be bottle tight under such conditions. It is no simple proposition to confine gas at such a pressure in a pipe of 20-in. diameter, but coupling manufacturers have solved that question fairly well. Oil lines of 10-in. diameter now work continuously at pressures up to 700 lb., while in 6 and 8 in. trunk lines crossing the greater portion of the continent pressures run up to 900 lb. Boosting pressures from 100 to 300 lb. has enabled gas companies to increase greatly the carrying capacity of their lines. Boosting to 600 lb. and continuing to boost whenever there is a slight fall in pressure will work wonders where the lines are sufficiently long to carry the system out with economy.

Baltimore Shipbuilding Plant Changes Hands

The Baltimore Dry Docks & Shipbuilding Company, Baltimore, Md., has acquired the two shipbuilding plants and other properties of the Skinner Shipbuilding & Dry Dock Company. The officers of the company are: President, Thomas H. Bowles, chairman of the board, Baltimore Trust Company; vice-president and general manager, Holden A. Evans, formerly naval constructor, U. S. Navy; assistant general manager, J. M. Willis; treasurer, William C. Seddon; secretary, Edwin W. Poe. The active management of the plant will be in the hands of Mr. Evans, who has had charge of the Skinner Shipbuilding & Dry Dock Company for the past year. The company owns the only drydocks in Baltimore, one 600 ft. in length and one 437 ft. In addition there are shops and equipment for all classes of repair work, and for the construction of tugs, torpedo boats, submarines and other vessels not exceeding 340 ft. in length. The plant will be greatly improved, and it will be the aim of the management to make it efficient in every department.

The American Blower Company, Detroit, Mich., has opened a branch office at Columbus, Ohio, in charge of L. E. Eisensmith, who formerly traveled in connection with the Pittsburgh office of the company. The Columbus offices are located in suite 810-811 Harrison Building.

WORKS SCHOOL FOR SALESMEN

The Training Course of the American Steel and Wire Company*

Some three years ago the officials of the American Steel & Wire Company recognized the necessity of providing some systematic and efficient means whereby our salesmen in a few weeks' time and at reasonable cost could better acquaint themselves with the manufacture of our varied products. This led to the development of a 6½ weeks' course, which is not only suitable for our veteran salesmen, but also is of practical value to men in active service in other departments. Candidates for this training course are organized into successive classes of about 12 each. The men are appointed from widely separated districts geographically, several weeks in advance, at which time the men are assigned a small amount of reading matter preparatory to the course.

The first three weeks of the course are spent in the Cleveland district. Three days are then devoted to the manufacture of certain products in the Pittsburgh district. The remaining time is spent in the specialty producing plants of the Worcester district. The members of a class meet on a certain specified day, the class is organized by an instructor, certain studies are assigned, and the regular work of the course begins. All traveling expenses are borne by the company, and a fixed daily allowance sufficient to meet his necessary living expenses is allowed each man.

HOW THE WORK IS LAID OUT

The work is so laid out that each succeeding day covers a new topic, and each day's work is handled in much the same manner. On Monday forenoon of each week a written examination is held, covering the work of the previous week. On every other working day, the whole forenoon is largely occupied by mill inspection under the direction of competent guides and instructors. After the mid-day lunch, furnished each day at the works dining room, the superintendent, or some expert appointed by him, thoroughly reviews the work of the morning, during which the students are encouraged to discuss freely all matters involved.

Following the discussion the students meet the director of the training course in an appointed assembly room for a thorough quiz covering the work of the day. This occupies two hours. This period, recurring daily, has developed into one of the most important and most interesting features of the course. It is here that every phase of the subject is developed largely by the students themselves and viewed from all possible angles. Questions are asked in such manner and of such nature as to draw the students out, set them thinking and induce them to use their imagination and reasoning powers. It is here, too, that scientific principles involved are discussed and explained. While due consideration is given the how concerning processes and operations, even more is given the why. This excites a keen interest in the work, and creates a desire on the part of each man to make a good showing among his fellows, hence, an added incentive to harder work and closer application. The man who thoroughly knows and understands the reasons why a certain specific material is used or required in a given set of conditions, or who knows why certain operations or processes have to be conducted in a certain manner, will possess a much broader and more useful working knowledge than he who has learned only how certain things are done. The one involves knowledge and thinking powers, the other may and usually does require only a superficial knowledge.

THE WHOLE STORY CONCISELY TOLD

At the close of each day's quiz, a small specially prepared booklet covering the work of the following day is given to each man, and these are studied during the

evening. These booklets, 33 in number, cover different phases of our business and they include all reading matter of the training course. They have been written by men of our own company, and edited by our educational committee appointed to look after the educational work. Taken collectively, the books read into each other and they develop the whole story in a concise and consecutive manner.

In the preparation of these special articles and in the development of the course, every effort has been made to secure maximum economy in both time and effort on the part of the student, since these are his two greatest assets. In the study of any particular subject, the student first reads a carefully prepared article devoted to that particular topic, he next witnesses all the processes and operations in the mill, he then discusses the subject with an experienced operating man, after which he is required to tell the story himself before others, going quite fully into descriptions and reasonings, and finally he is given a written examination on the subject. It is surprising how much knowledge a man can acquire in one day when he concentrates his whole attention in the foregoing manner on a single phase of the business.

During the first week of the course, the student is shown how iron ore is converted into pig iron, how pig iron, with or without scrap, is converted into the common grades of steel, and, finally, how the steel ingot is converted into wire rods. The chemistry and metallography of the subject are taken up as far as time and the limited preparatory knowledge of the men will permit.

The second week is devoted largely to the processes involved in the conversion of wire rods into wires of various kinds and shapes, both by cold drawing and by cold rolling. A few days are taken up with the subjects of heat treatment, testing of materials, galvanizing and tinning. The last week is given over to the study of electricity and to the manufacture of electrical products, the remainder of the time being given to a study of the fabrication of wire into our various kinds of products, such as woven wire fencing, barb wire, wire rope, springs, nails of all kinds, bale ties and so on. In each case the student not only makes a study of raw materials and finished products, but he also witnesses all the essential mechanical processes involved in the conversion of the one into the other and he studies all underlying principles. In one or more of the three districts visited, the men witness the manufacture of every product made by the company.

KNOWLEDGE CREATES CONFIDENCE

At odd times in the course, regular set lectures are given by men of the company on such subjects as transportation of products, welfare work, accounting department, the history and development of the business, and kindred subjects. No attempt as yet has been made to teach the art of salesmanship, or to take up the commercial phases of our business. The principal object has been to acquaint our older employees more thoroughly with all of our products, and with all essential details involved in their production, to give them a concrete conception of all those necessary factors which go to make up costs, to acquaint them with those countless problems continually presenting themselves to the operating department in the manufacture of high grade materials. Incidentally, it is giving our men a much greater confidence in themselves and in the goods they handle. They are acquiring a new and broader conception of the business as a whole; they are fired with a new zeal and a new ambition for the company's interests. The training course serves also to draw the men of the various departments closer together, and it naturally results in their working in closer harmony. In a word, it is a powerful agent in producing better teamwork, good fellowship and greater efficiency.

The Mines and Metallurgy departmental jury of the Panama-Pacific International Exposition, composed of 29 engineers and scientists, commended in a resolution the mining exhibits in particular and the exposition in general.

*Paper practically in full from the Bulletin of the National Association of Corporation Schools, and presented by C. R. Sturtevant, educational director of the American Steel & Wire Company.

RAILROAD SUPPLY EXHIBIT

Fewer Number of Machines at Atlantic City—
War Business Restricted Show

Several influences combined to make the annual exhibit of the Railway Supply Manufacturers' Association at Atlantic City smaller than usual this year. It was held June 9 to 16 on the Steel Pier in connection with the conventions of the American Railway Master Mechanics' Association and the Master Car Builders' Association. The first three days were given over to the proceedings of the master mechanics and the last three to the car builders.

The space required for the exhibit this year approximated 70,000 sq. ft. against 82,000 sq. ft. last year. Naturally the registration of supply and machinery men was under normal, but that of the railroad men was up to the mark. The most noticeable difference in the exhibit, comparing it with last year, was the small showing of machine tools. Only eight machine-tool builders had space, and, of these, two had booths only. Many builders were so busy that they could not afford to leave their factories, nor could they find even one machine available for display. The Warner & Swasey Company showed two of its universal hollow hexagon turret lathes, and both were to be shipped to a plant near Philadelphia at the end of the show. The Windsor Machine Company rushed work on a machine to have it in readiness for the exhibit, but failed to squeeze it out, so great was the demand from other directions. The few who were represented—including the Niles-Bement-Pond Company, Manning, Maxwell & Moore, Inc., Landis Machine Company, Lucas Machine Tool Company, William Sellers & Co., Inc., and the Stockbridge Machine Company—had concentrated upon them the attention usually given to a much larger number of exhibitors.

While some firms failed to exhibit because they were so busy, others did not appear because their business had been light and they were actuated by motives of economy. It must be admitted that had this year's show been the first of its kind it would have been considered a wonderful one. Among the displays which attracted especial attention was a Putnam carwheel boring mill of the latest type, shown by Manning, Maxwell & Moore, Inc., and a gyro-aeroplane cylinder machined on a Warner & Swasey universal hollow hexagon turret lathe and shown by that company. In fact, every exhibit held the interest of the master mechanics, as well as that of the casual visitor. Among the exhibitors were the following:

Allegheny Steel Company, Pittsburgh.—Forsyth forged-steel truck side-frames; steel ties; continuous tie plates; rail braces; anti-creeping devices; spring plates; journal box lids; pressed steel specialties.

Alston Saw & Steel Company, Folcroft, Pa.—Unbreakable hack saw blades in operation.

American Abrasive Metals Company, New York City.—Feralun slip-proof treads for car steps, etc.; Standard door sills for subway cars; new perforated slip-proof step tread; Feralun slip-proof floor plates; Feralun wheel truing brake shoes.

American Car & Foundry Company, New York City.—Cast iron wheels.

American Flexible Bolt Company, Pittsburgh, Pa.—American staybolts; staybolt bushings; U. S. self-locking bolt.

American Malleable Castings Association, Cleveland, Ohio.—Walker wedge testing machine; photo-micrographs of malleable iron in its various stages of manufacture and sample castings and specimens.

American Steel Foundries, Chicago.—Vulcan truck; Andrews side frames; cast steel bolsters; Simplex bolsters; Simplex couplers; American coupler pocket; Economy draft arms; Davis cast steel wheels; brake beams; springs; Susemihl roller side bearings; miscellaneous steel castings.

Armstrong Cork & Insulation Company, Pittsburgh.—Nonparell corkboard insulation for cars, etc.; Nonparell insulating brick; Nonparell high pressure covering; cork covering for drinking water lines, brine and ammonia lines and cold pipes; Linotile for floors.

Ashton Valve Company, Boston.—Master mechanic standard locomotive muffler and open pop safety valves; locomotive steam and air gages; wheel press recording gages; whis-

ties; dead weight gage testers; piston Schwabs; locomotive boiler appliances.

Boker & Co., Inc., H., New York City.—High speed and tool steel; metal specialties.

Besly, Charles H., & Co., Chicago.—One No. 15 30-in. direct connected motor-driven pattern makers' disc grinder. One No. 51 26-in. motor-driven disc grinder with 18-in. Helmet pressed steel ring wheel chuck.

Buckeye Steel Castings Company, Columbus, Ohio.—Two 50-ton cast steel truck bolsters; one 50-ton cast steel pedestal type side frame; one 50-ton cast steel side frame; one cast steel yoke for friction gear; one cast steel yoke for tandem gear; cast steel journal boxes; Major coupler.

Byers & Co., A. M., Pittsburgh.—Wrought-iron pipe.

C & C Electric & Mfg. Company, Garwood, N. J.—One 400 ampere electric arc welding outfit.

Cambria Steel Company, Philadelphia.—Slick draft gear.

Carnegie Steel Company, Pittsburgh.—Schoen steel wheels; Slick wheel products, consisting of gear blanks, gear ring, gear rim blanks, turbine disc blanks, industrial wheels, street carwheels, etc., together with exhibits of ingots and discs from which wheels are made; standard railroad ties, joints and fastenings; alloy steels; steel sheet piling.

Crane Company, Chicago.—Locomotive pop safety valves; locomotive blow-off valves; locomotive cab valves; globe, angle, check and gate valves; Crane-Erwood automatic stop and check valves; steam separators; steel valves for high pressure; automatic exhaust and relief valves; steam traps.

Crosby Steam Gage & Valve Company, Boston.—Locomotive safety valves; locomotive pressure gage; Johnston blow-off valve; recording gage for hydraulic presses; gage testing apparatus; indicators and their attachments.

Dearborn Chemical Company, Chicago.—Water treating preparations scientifically prepared to suit conditions shown by analyses of the boiler water supplies, for prevention of scale, corrosion, pitting and foaming.

Detroit Lubricator Company, Detroit, Mich.—Bullseye locomotive lubricators; flange lubricators; air cylinder lubricators; sight feed lubricators; force feed oilers; Detroit packless radiator valves.

Dixon, Joseph, Crucible Company, Jersey City, N. J.—Specimens of scale removed from boilers obtained through the use of Dixon's boiler graphite; photographs of various types of structures protected by Dixon's silica-graphite paint; samples of graphite lubricants especially adapted for railroad work; instruction cards.

Duff Mfg. Company, Pittsburgh.—Barrett track jacks; Duff high speed ball bearing screw jacks; Barrett car jacks; Duff improved geared ratchet jacks; Duff-Bethlehem forged steel hydraulic jacks; Duff journal box jacks.

Edison Storage Battery Company, Orange, N. J.—Storage batteries for train lighting; industrial shop and baggage trucks; multiple unit control; locomotive headlights; railroad signaling; inspection lamps.

Electric Controller & Mfg. Company, Cleveland, Ohio.—Youngstown safety limit stop; crane switchboard with overload release; automatic machine-tool controllers; push button controllers for wood-working machinery; drum type controllers; cast grid resistance; literature of lifting magnets handling scrap iron, rails, etc.

Esterline Company, Indianapolis, Ind.—Golden Glow locomotive headlights; mine locomotive headlights; marine, dock and industrial searchlights; Esterline graphic meters.

Fort Pitt Malleable Iron Company, Pittsburgh, Pa.—Reception booth.

Garlock Packing Company, Palmyra, N. Y.—Air pump and throttle packings; air brake and triple valve gaskets; special packings for accumulators and compressors; general line of shop packings.

General Electric Company, Schenectady, N. Y.—Electric arc welding equipment; electric furnace; electric oil tempering bath; several types of motors; control; flow meters; incandescent lamps.

Goldschmidt Thermit Company, New York City.—All materials for welding locomotive frames and other broken locomotive parts; large sample welds on crank shafts; photographs of important welding operations; demonstrations of the process as applied to pipe welding and samples of metals and alloys produced free from carbon by the Thermit process.

Goodyear Tire & Rubber Company, Akron, Ohio.—Samples of Subers hose.

Greene, Tweed & Co., New York City.—Palmetto braided packing for piston rods; twist packing for globe valves, etc.; packing in sets for air pump service; packing in sets for throttle valve service; Manhattan packing for hydraulic pressures; Favorite reversible ratchet wrench for nut turning.

Greenfield Tap & Die Corporation, Greenfield, Mass.—Motor-driven bolt cutter; Acorn screw-cutting dies; reversing tapping chucks; automatic opening die head; reamers of

all descriptions; new style or gun tap; friction tapping chucks; gages; hand taps and stay bolt taps.

Haring, Ellsworth, New York City.—E-H double X high speed steel, tool steels and specialties.

Harrington, Son & Co., Inc., Edwin, Philadelphia.—Chain hoists and travelers for overhead track.

Illinois Steel Company, Chicago.—Samples of heat treated track and crossing bolts with physical tests.

Independent Pneumatic Tool Company, Chicago.—Reception booth.

Ingersoll-Rand Company, New York City.—Little David pneumatic chipping and riveting hammers; jam riveters; holder-ons; pneumatic drills; Crown sand rammers and Imperial motor hoists.

International Oxygen Company, New York City.—I. O. C. system of oxy-hydrogen generators and accessories; I. O. C. stud valves; oxygen testing apparatus; high pressure oxygen cylinders.

International Steam Pump Company, New York City.—One 12x7x10 Laidlaw feather valve air compressor, direct connected by close belt drive to 50 hp. General Electric motor; model of Glenora triple plunger deep well pump; Jeaneville horizontally split case turbine centrifugal pump.

Jenkins Bros., New York City.—Valves in brass, iron body and cast steel, for all pressures and purposes; round house valves; equalizing stop and check valves; mechanical rubber goods; sheet packing; gaskets; valve discs and rings; new oil-proof sheet packing, car heating discs.

Jessop, William & Sons, Inc., New York City.—Jessop's steel tools.

Johns-Manville Company, H. W., New York City.—Magnesia lagging; fire felt lagging; vitribestos; pipe coverings; air pump and throttle packing; sheet packing; gaskets; mill-board; Transite and Ebony asbestos wood; asbestos shingles; friction and rubber tapes; electrical materials; fibre and sectional conduit; dry batteries; asbestos roofings; asbestos corrugated roofing; waterproofing and mastic; J-M expander rings; hair felt insulators; passenger and refrigerator car insulations; Vulcabeston; high temperature and insulating cements; smoke jacks; cork; armored hose; brake band lining; asbestos-metallic brake blocks.

Jones & Laughlin Steel Company, Pittsburgh.—Reception booth.

Landis Machine Company, Waynesboro, Pa.—One 4-in. pipe threading and cutting off machine; chaser grinder; one 2-in. single spindle bolt cutter, belt driven; one 1½-in. double spindle bolt cutter, motor driven; one 2-in. stationary type pipe die head; one 8-in. stationary type pipe die head; one 1¼-in. automatic screw cutting die head; one 1-in. solid adjustable die head.

Lubricating Metal Company, New York City.—Noheet bearing metal; Noheet metallic packing.

Lucas Machine Tool Company, Cleveland, Ohio.—Number 32 Precision horizontal boring, drilling and milling machine.

Lukens Iron & Steel Company, Coatesville, Pa.—Reception booth, with photographs of mill operation.

Lunkenheimer Company, Cincinnati, Ohio.—High grade steam engineering and motor accessory appliances; valves bronze, iron body brass mounted; puddled semi-steel and crucible cast steel; whistles, water gages and gage cocks; ground key specialties; oil and grease cups; lubricators and oiling devices.

Mahr Mfg. Company, Minneapolis, Minn.—Mahr patent portable torches for car repair; boiler shop, foundry, brazing, paint burning and oil burning rivet forge work.

Manning, Maxwell & Moore, Inc., New York City, and subsidiary companies, comprising the Putnam Machine Company, Ashcroft Mfg. Company, Consolidated Safety Valve Company, Hancock Inspirator Company and Hayden & Derby Mfg. Company.—Putnam latest carwheel boring mill; latest pattern 36-in. geared head lathe; No. 4 new pattern double axle lathe; journal turning lathe; National Machinery Company's latest type machines for forging and bolt cutting; a complete exhibit of brass goods consisting of Hancock inspirators, check valves, steam valves, hose strainers, boiler washers and other locomotive appliances; Metropolitan injectors; Consolidated safety valves; Ashcroft gages; Tabor indicators and instruments for measuring steam, water and gas.

McConway & Torley Company, Pittsburgh.—Pitt passenger couplers; Pitt 3-stem passenger coupler equipment; Pitt freight coupler; Penn freight couplers of top and side operating designs.

Midvale Steel Company, Philadelphia.—Reception booth.

Nathan Mfg. Company, New York City.—No. 10 XX Monitor injector; No. 11 Simplex injector, type R, flanged; No. 10 Nathan injector, flanged; No. 10 Simplex HW nonlifting injector, flanged; 3-feed BE cup with cut out with booster; never leak gage cock; coal sprinkler; balanced starting valve; 2-in. double boiler check type T, 2-in. starting valve flanged; 2-in. intermediate steam valve; locomotive pumps with 4 feeds; type B stationary pump 1 quart,

3-feed; type A pump 1 pint; type A pump ½ pint; balanced steam valve, flanged bonnet; quadruple BE type 166 with cut out; quintuple feed BE 166 with cut out; single and double air cylinder attachment; never-leak gage cock; 3-sided Delco water gage guard; 4-sided Delco water gage guard; Klinger water gage guard No. 4; sectional model of type B pump; Woods pump, 1 quart, 3-feed.

National Lead Company, New York City.—Red lead in paste form; steel cars (models) painted with paste red lead.

National Lock Washer Company, Newark, N. J.—Models of car curtains; curtain and window fixtures; National lock washers; Hipower nut locks.

National Malleable Castings Company, Cleveland, Ohio.—Couplers; journal boxes; brake staff mechanism; malleable iron castings.

National Tube Company, Pittsburgh.—Reception booth.

Niles-Bement-Pond Company, New York City.—Niles 44-in. vertical boring and turning mill; Bement 60-in. duplex horizontal borer, driller and miller.

Norton, A. O., Inc., Boston.—Self lowering high speed jacks.

Nuttall Company, R. D., Pittsburgh.—Flexible gears and pantograph trolley; locomotive rings, gears and third rail pantograph trolleys; 10-in. trolley wheel and harp for high speed interurban and locomotive service; display of heat treated steels as applied to gears and pinions.

Nutter & Barnes Company, Hinsdale, N. H.—Automatic cold sawing machines; abrasive wheel metal cutting machines; automatic metal saw sharpeners, universal tool grinders; hydraulic plain cylindrical grinders; saw-gear and milling cutter sharpeners; motor driven.

Parkeburg Iron Company, Parkeburg, Pa.—Charcoal iron boiler tubes; safe ends; arch tubes and locomotive superheater tubes, and Lohmannized boiler tubes.

Power Specialty Company, New York City.—Full size model of Foster locomotive superheater.

Pyrene Mfg. Company, New York City.—Pyrene fire extinguisher for railroad coaches, freight platforms, signal towers, buildings, offices, oil houses.

Ryerson & Son, Joseph T., Chicago.—Ulster special stay-bolt iron; Ulster engine bolt iron; Nikrome locomotive forgings; photographs and drawings of special railroad shop machinery.

Sellers, William & Co., Inc., Philadelphia.—Reception booth.

Stockbridge Machine Company, Worcester, Mass.—One 20-in. Stockbridge patented two-piece-crank motion motor-driven shaper.

Superior Oxygen Company, Pittsburgh.—Oxygen and oxy-acetylene welding and cutting apparatus.

Symington Company, T. H., Rochester, N. Y.—Reception booth.

Union Spring & Mfg. Company, Pittsburgh.—Kensington pressed steel journal boxes; coil and elliptic springs for steam and electric roads; machinery and agricultural implement springs; pressed steel spring plates and journal box lids; pressed steel shapes of various designs.

United Engineering & Foundry Company, Pittsburgh.—Photographs of forging press installations in railroad and other forge shops.

U. S. Metal & Mfg. Company, New York City.—Cayuta ball and cone bearing screw jacks, high speed and standard; ratchet jacks, pressed steel seamless gear case; Linofelt and Fibrofelt.

Warner & Swasey Company, Cleveland, Ohio.—One No. 2A universal hollow hexagon turret lathe, operating on bar work; one No. 3A universal hollow hexagon turret lathe operating on chucking work.

Wayne Oil Tank & Pump Company, Fort Wayne, Ind.—Hand and power driven self-measuring pumps and storage tanks.

Westinghouse Air Brake Company, Pittsburgh.—Reception booth.

Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.—Reception booth. Lighted with 200-watt type C mazda lamps.

Westinghouse Friction Draft Gear Company, Pittsburgh.—Reception booth.

Westinghouse Lamp Company, East Pittsburgh, Pa.—Reception booth.

Westinghouse Machine Company, East Pittsburgh, Pa.—Reception booth.

Windsor Machine Company, Windsor, Vt.—Reception booth.

Yale & Towne Mfg. Company, New York City.—Yale triplex hoists, trolleys, electric hoists, battleship projectile hoists and Yale coach door closers.

The Baker Motor Vehicle Company and the Rauch & Lang Carriage Company, Cleveland, Ohio, makers of electric vehicles, will be merged under the name of the Baker, R. & L. Company. C. L. F. Wieber, president of the Rauch & Lang Company, will be at the head of the new company.

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The Right of Peaceful Assembly

Although apparently protected by the constitution of the United States, manufacturers have for some years regarded themselves as separated from other citizens in the right of assembly and of exchanging views. They have been under the ban, being regarded with suspicion whenever even a few of those engaged in any particular branch of business happened to meet. Congressional investigations and judicial proceedings had so disheartened and discouraged them from conferring with one another, even when no question of a price agreement, division of trade, or division of territory was up for discussion, that it seemed as if, unlike other citizens, they would never be permitted to assemble and endeavor to correct grievances or faulty customs which had crept into their trade. It is, therefore, refreshing to find in the opinion handed down by Judge Buffington in the United States Steel Corporation suit this dictum in connection with his discussion of the so-called "Gary Dinners":

Freedom of speech and freedom of individual action are justly prized in American society, and no legislation forbids men to come together and speak freely to each other about every detail of their common business. And if each individual should choose to announce at such a meeting the specific price he intends to charge for his wares, we are aware of no law that forbids him so to do.

Manufacturers and representatives of the Government are alike interested in this judicial utterance. It clarifies the atmosphere and should remove from manufacturers the shadow of Government interference which was threatened whenever those engaged in the same branch of trade felt the desirability of meeting for the purpose of effecting some improvement in undesirable trade conditions. Manufacturers should hail this declaration from the bench as the beginning of a new era of trade independence.

More Wire Rods Than Steel Rails

Some years ago the suggestion was made in these columns of the probability that the production of wire rods in this country would eventually exceed the production of steel rails. This was based on the steadily growing consumption of wire, causing an almost continuous annual increase in the output of wire rods, in comparison with the irregular increase in the consumption of rails. Occasionally in the interval the gap narrowed considerably between the

output of rails and wire rods, but the production of rails until recently was too great for the output of wire rods to overtake it. The expected, however, happened in the past year.

The statistics issued last week by the American Iron and Steel Institute covering the production of wire rods show that in 1914 the output was 2,431,714 gross tons against the output in the same year of 1,945,095 gross tons of all kinds of rails, as reported by the same authority in its statistical statement issued March 26, 1915. It would almost appear like boasting over a crippled contestant, however, for the wire-rod manufacturers to draw this comparison, as the production of rails last year was most unfavorably influenced by the unfortunate financial condition of railroad companies which prevented them from purchasing rails in their usual quantities. The output of rails in 1914 was about a million and a quarter tons below the average of the previous five years. The wire trade, it is true, was also not up to its standard in 1914, as the output in 1912 was about 220,000 tons greater. Nevertheless, it happened that the wire trade was not so seriously depressed as the rail trade. Consequently, although the precedent has at last been established of the annual production of wire rods exceeding that of rails, it remains to be seen whether this assumption of leadership is simply an accident or whether it can be maintained after conditions become normal in the whole steel trade.

Our Steel Making Capacity

It has become the fashion to speak of steel mill activity in terms of percentage of "capacity" in operation. Like some forms of slang, the usefulness of the expression counts for more, in giving it vogue, than its accuracy. For, since the manufacturers know precisely how many tons of steel ingots they are producing from week to week, if such production represents, let us say, 75 per cent. of "capacity," then the "capacity" is precisely one and one-third times that tonnage. As a matter of fact, however, steel mill managers today are as well posted as to the number of tons they do turn out as they are poorly posted regarding the number of tons they could turn out, given the orders, the men and the raw materials. It is a notorious fact, indeed, that the iron and steel industry does not know its capacity except when it has an opportunity to

try it out. When statements are made that the tonnage being turned out represents a given percentage of capacity, there has preceded a rough estimate of the capacity, and only a rough one. If such estimates, whatever they may be, are not changed from week to week or month to month, the estimates of percentages of operation from period to period furnish a convenient and not misleading means of showing concisely how steel trade activity is varying. If, however, one is rash enough to conclude that when the steel industry is estimated to be operating at 80 per cent. of capacity an increase of one-third in the tonnage demand would produce a scarcity of steel he would be on unsafe ground.

Apart from the fact that various refinements, minor improvements and the acquisition of greater skill in hard driving all tend to increase steel mill capacity from year to year, there is the important fact that Bessemer steel making capacity is being rated less and less, because the demand has been trending strongly to open-hearth, and it is regarded as impossible that all the Bessemer capacity in physical existence will ever be called upon to operate again, even though buyers of open-hearth steel may be inconvenienced by not obtaining desired deliveries.

There is practically no such thing at this time as abandonment of open-hearth steel making capacity. A suggestion as to the reserve with which statements of current steel mill operations, in percentages, should be used to indicate what the capacity really is can be furnished by a simple computation. In 1913 the United States made its record production of steel ingots and castings, 31,300,874 gross tons. Of this, 9,545,706 tons was Bessemer, but the production of Bessemer in 1906, the record year, had been 2,730,000 tons greater. A new standard Bessemer plant was completed and put in operation after the middle of 1906, while we know of only one Bessemer plant that has been definitely abandoned and dismantled. Some Bessemer capacity has been diverted to duplexing, but the attendant open-hearth furnaces, in general summaries of new construction, are usually rated at the separate and not their combined capacity. If, then, we should take the 1913 production of steel ingots and castings, 31,300,000 tons, add to the tonnage the Bessemer capacity evidently idle, allow for the fact that some of the open-hearth capacity was not operative during the entire year, and then allow for the known additions to capacity that have since been made, we would have a very large total. We think it could be fairly computed, on these premises, that the existing steel making capacity is not less than 40,000,000 gross tons per annum. Assuming, as seems reasonable, that works that have not had their capacity increased by the addition of new open-hearth furnaces could really turn out somewhat more steel than they could two years ago, the capacity might be assumed to be materially in excess of 40,000,000 tons. If, however, one interpret this to mean that if the steel works are operating at 75 per cent. of "capacity" they are actually turning out steel at a rate materially in excess of 30,000,000 gross tons per annum he is probably in error to the extent of several million tons. It is reasonable to infer that when a steel company admits that it is

operating at 60 per cent., or 70 per cent. or 80 per cent. of capacity it is turning out 60, 70 or 80 per cent. of the steel that it would be turning out if it were merely comfortably employed, and that given the opportunity it would be able, with good weather, ample labor supply and adequate raw materials, to jog along under quite a considerable overload.

Except as to Bessemer steel, the relative output of which depends so much upon the preference of the buyer, the steel making capacity, whatever it may be, is a more closely determinable quantity than the pig-iron making capacity. Given only moderate prices for steel, practically all the steel-making capacity in physical existence is also in commercial existence. That is not the case in the blast furnace industry, for there are many blast furnaces in physical existence that are not commercially potential unless pig-iron prices are relatively high.

Immigration and Labor Supply

The distinct possibility that the iron and steel industry may be called upon in the near future to produce all the material it is physically capable of producing is one contingency, and the possibility of Italian emigration, now that Italy is at war, and of emigration to Balkan countries if other of those states enter the war, is another contingency making a study of recent immigration and emigration statistics of particular interest. It will be generally admitted that such statistics are ordinarily quite the reverse of interesting, but as a result of the general aversion knowledge of the trends and conditions is quite uncommon and study is therefore particularly necessary at this time.

The statistics of immigration commonly published and used as indicative of the general movement refer to the immigration of aliens, that is, of those arriving aliens who declare an intention to make the United States their permanent abode. Such immigration reached its maximum in the fiscal year 1907, with a total of 1,285,349 persons, but the next largest was in the fiscal year 1914, with 1,218,480. In 1913 and 1914, however, there arrived an average of 200,000 a year of "non-immigrant aliens." These are not usually counted, but the statistics really break down, for they refer merely to the declaration made by the persons upon arrival. These may change their minds and eventually determine to remain in the United States. The "immigrant alien" may likewise change his mind, and conclude to go back after all.

There are two other groups of statistics infrequently consulted that bear upon the number of people of foreign birth in the United States at any given time. First, there are the departures respectively of "emigrant aliens" and "non-emigrant aliens" and the inclusion in the one category or the other of a departing alien depends simply upon his frame of mind at the moment of departure. The declared "emigrant alien" may after all return to this country, while the declared "non-emigrant alien" may never get back. Second, there are arrivals and departures of "citizens" and the departing citizens may never come back.

All these figures run into the hundreds of thousands per year, so that it may readily be observed

that the mere statement of "immigration," meaning merely the arrival of immigrant aliens, may be altogether misleading.

So far as concerns coke works and blast furnace and steel mill labor, it is well understood in the trade that the declaration that the immigration or emigration is either temporary or permanent is very far from conclusive. The movement in the first place is largely determined by industrial conditions, whether flourishing or otherwise, and the declaration of the immigrant or emigrant may or may not be carried out. It is also rather well understood in the trade that the possession of citizenship does not insure the return of the departing foreign born workman.

In the fiscal year 1905 the immigration, or number of immigrant aliens, first passed the one million mark, and the average in the 10 years, 1905 to 1914, was 1,012,000 a year, the heaviest year being 1907 and the next, 1914. Industrial conditions may be assumed to have been relatively good in the fiscal year 1913 and relatively bad in the fiscal year 1914. The figures showing total arrivals and departures in the two years are as follows, similar figures for the following ten months, July, 1914, to March, 1915, being appended:

	Fiscal year, 1913	Fiscal year, 1914	Ten months ending April, 1915
Arrived:			
Immigrant aliens....	1,197,892	1,218,480	278,033
Non-immigrant aliens	229,335	184,601	95,349
Citizens	286,604	286,586	218,385
Total arrivals....	1,713,831	1,689,667	591,767
Departed:			
Emigrant aliens....	308,190	303,338	184,497
Non-emigrant aliens	303,734	330,467	160,521
Citizens	347,702	368,797	155,497
Total departures.	1,059,626	1,002,602	500,515
Excess arrivals	654,205	687,065	91,252

Thus while "immigration" so-called increased from 1913 to 1914 by 20,588, the increase in the population through arrivals and departures was 32,860. The count of heads, irrespective of citizenship or declaration of intention as to future permanent abode, differs from the "immigration" statistics by 12,272.

In the ten months, July to April inclusive, embracing the first nine months of the war, the rate of arrivals of immigrant aliens decreased by 73 per cent., of non-immigrant aliens by 38 per cent. and of citizens by 8 per cent., the rate of all arrivals decreasing 58 per cent. One would probably suppose that the arriving citizens were more numerous since the war started. That was not the case; they merely appeared more prominently in the daily press through the medium of the interviewers.

In departures the annual rate suggested by the figures for ten months decreased 27 per cent. with emigrant aliens, 42 per cent. with non-emigrant aliens and 49 per cent. with citizens, making a decrease in the total of 40 per cent.

These figures do not suggest as large a movement out of the country of men intending to engage in war as might possibly have been expected. Where the increase in population has suffered has rather been in lack of arrivals. The excess of arrivals in the ten months, 91,252, represents an annual rate of 109,502, a decrease from the average of the two preceding years of 561,133. Beyond question that will tell in case the iron and steel and coke in-

dustries should undertake in the near future to operate at capacity; and as the months pass there is no doubt that the balance as to labor supply will become increasingly unfavorable.

Central Steel Company's Good Start

The Central Steel Company, Massillon, Ohio, furnishes the following interesting statement regarding the starting of its new steel plant:

"On Monday, June 7 at 8 p.m., we poured our first heat of steel, approximately 60 tons, and heats have been taken off continuously and successfully since that time. While there was the usual nervousness attendant with first operations, everything moved smoothly and a successful heat was secured as to quality and uniformity of steel which consisted of soft basic open-hearth steel slabs with the following analyses: Carbon, 0.11; manganese, 0.42; sulphur, 0.030; phosphorus, 0.014. On Thursday, June 10, our blooming mill was put in operation and our first ingot rolled into a 4 x 4 in. billet. This was brought down to specified size, rolled perfectly and sheared to required lengths. We believe it is a record to be able to pour, roll and ship the first heat.

"It will be of additional interest to know that the billets rolled on Thursday were the first that have ever been rolled on an all electrically driven and operated blooming mill in this country and what is true of our blooming mill applies throughout our entire plant. All equipment is electrically driven and controlled without a steam line or foot of line shafting or belting in the entire operation. Our electric energy is purchased through our local lighting plant, which has been equipped with every modern prime mover to give us efficient and reliable service. Satisfactory orders have been secured for immediate shipment and shipment through the third and fourth quarters. Our products consist of open-hearth billets, slabs and sheet bars as well as billets of various grades of vanadium, nickel and chrome steels."

The Pennsylvania Rail Order

The Pennsylvania Railroad announced in the past week the placing of 155,500 tons of steel rails for delivery in 1915 in addition to the special rollings amounting to 12,000 tons for which orders were given out earlier in the year. Of the orders just placed 118,000 tons will be 100-lb. rails and 37,500 tons 125-lb. rails. The Cambria Steel Company and the Pennsylvania Steel Company, each of which received 34,850 tons of the order, will roll all of the 125-lb. rails, these being equally divided between the two. Each of these companies will roll 16,100 tons of 100-lb. rail. The Cambria and Pennsylvania companies are the only ones which will use sinkhead ingots in manufacturing the Pennsylvania rails. The analyses specified by the Pennsylvania Railroad for the two sizes of rails are as follows:

100-lb. rails—Carbon, 0.60 to 0.75; phosphorus, not to exceed 0.04; manganese, 0.60 to 0.90; silicon, 0.10 to 0.30.

125-lb. rails—Carbon, 0.68 to 0.82; phosphorus, not to exceed 0.04; manganese, 0.80; silicon, 0.05 to 0.20.

The Chesapeake Nail Works, which is part of the property of the Central Iron & Steel Company, Harrisburg, Pa., is to be dismantled and the amount realized is to be spent in the improvement of the company's open-hearth steel furnaces. This plant was for a time operated under lease by Charles L. Bailey & Co., in the manufacture of cut nails, but it has been lying idle for a long time, owing to the steadily diminishing demand for the product.

The Denver & Salt Lake Railroad has ordered 8 Mikado type locomotives from the Lima Locomotive Corporation and the New York, Ontario & Western 12 Santa Fe type from the American Locomotive Company. The Intercolonial Railway has asked for bids on 20 locomotives.

AN ARSENAL LABOR PROBLEM

Private Works Hiring Away Important Men—
Law May Be Invoked

WASHINGTON, D. C., June 15, 1915.—Manufacturers having foreign orders for munitions of war of various types are winning away from the Government arsenals machinists, foremen, superintendents and even army officers in such numbers that the War Department finds itself facing a very serious problem, to meet which it may be necessary to take drastic measures.

As is well known in the trade, the foreign demand for munitions of war has not only taxed the capacity of American manufacturers whose regular business it is to produce these articles and who have highly trained organizations equal to any ordinary requirements, but has induced manufacturers of entirely different classes of articles, whose output has been reduced by the general business depression of the past year or more, to undertake the production of fixed ammunition, shrapnel, shells, etc. The chief embarrassment encountered by this latter class of manufacturers has been the difficulty of obtaining specially skilled workmen and experienced superintendents. The country has been searched from coast to coast for skilled labor. Naturally the Government arsenals have been the principal point of attack. Machinists and other skilled workers experienced in the manufacture of these products have been tempted to leave their Government jobs by offers of extraordinary high wages, while foremen and superintendents receiving \$1,500 to \$1,800 a year from the Government have been offered as much as \$5,000 a year. What financial propositions have been made to induce army officers to resign from the service and to forfeit rank and retirement pension prospects are not known, but obviously they must have been extraordinary, as several officers with special experience in ordnance manufacture have tendered their resignations.

So far as army officers are concerned, the situation can easily be met by the refusal of the Secretary of War to accept resignations. As to civilian employees, however, the problem is not so simple. In this connection the following provision of the Revised Statutes of the United States, the text of which has been retained in the latest revision authorized by Congress, is cited as applying to this emergency:

Section 1667. If any person procures or entices any artificer or workman retained or employed in any arsenal or armory to depart from the same during the continuance of his engagement or to avoid or break his contract with the United States, or if any person, after due notice of the engagement of any such workman or armorer during the continuance of such engagement, retains, hires, or in any wise employs, harbors or conceals any such artificer or workman, he shall be fined not more than \$50 or be imprisoned not more than three months.

It is frankly admitted by the War Department officials that the language of this statute is ambiguous and that it is a question whether it can be invoked to prevent machinists and other skilled workmen from being induced to leave their Government jobs. Much will depend upon the construction by the courts of the term "during the continuance of his engagement." Of course, any mechanic is at liberty to leave the Government service at any time and few, if any of them, are under any contract, expressed or implied. Nevertheless, it is quite possible that the courts might hold in the case of any civilian employee that he was under contract to the Government until he had severed his relation by the usual notice, and, hence, that any person who sought to induce him to leave his Government job would be liable to the penalties in the section quoted. It is more than probable that Congress at its next session will be asked to pass a new and more definite and comprehensive law on the subject which can be invoked in any similar emergency.

W. L. C.

The Otto Coking Company, 6 Church street, New York, has secured a contract for erecting benzol apparatus in connection with the by-product coke works of the Citizens Gas Company, Indianapolis, Ind. It is specified that the benzol addition shall be in operation in 90 days.

CONTENTS

Safety Feed Increases Production.....	1333
Works Apprentice School Discontinued.....	1334
A Duplex Piston Ring Milling Machine.....	1335
New Forge Shop of Upson Nut Company.....	1336
The Commercial Production of Sound Steel.....	1343
A British Protest on Metallographic Nomenclature.....	1346
Metal-Working Machinery.....	1346
Canadian Industrial Notes.....	1347
Birmingham Sentiment on the Steel Suit.....	1347
A Works Store Operated at a Profit.....	1348
Waste-Heat Boilers in Steel Plants.....	1349
Ewald Iron Company's New Owners.....	1352
Pipe Couplings for Natural Gas.....	1352
Baltimore Shipbuilding Plant Changes Hands.....	1352
Works School for Salesmen.....	1353
Railroad Supply Exhibit.....	1354
The Right of Peaceful Assembly.....	1356
More Wire Rods Than Steel Rails.....	1356
Our Steel Making Capacity.....	1356
Immigration and Labor Supply.....	1357
Central Steel Company's Good Start.....	1358
The Pennsylvania Rail Order.....	1358
Sprague Electric Club.....	1359
An Arsenal Labor Problem.....	1359
Steel Corporation's Orders Increase in May.....	1359
The Iron and Metal Markets.....	1360
Sparrows Point Shipyard Busy.....	1373
Buffalo Coke Discrimination Case.....	1373
Pittsburgh and Nearby Districts.....	1374
Large Mill Additions at Youngstown.....	1374
Corporation School Work.....	1375
Cambria-Pennsylvania Merger Reports Revived.....	1375
May Orders for Freight Cars Large.....	1375
Obituary.....	1376
Substituting Lead-Coated Sheets for Galvanized.....	1376
Personal.....	1377
A Large Boiler Contract.....	1377
Idle Cars Increase in May.....	1377
Fabricating Orders 61 Per Cent. in May.....	1377
Machinery Markets and News of the Works.....	1378
Trade Publications.....	1386

Steel Corporation's Orders Increase in May

The United States Steel Corporation's regular monthly statement of unfilled orders on its books May 31, 1915, shows a total of 4,264,598 tons, as compared with 4,162,244 tons on April 30, 1915, an increase of 102,354 tons. February had shown an increase of about 100,000 tons, and March and April reductions of 90,000 and 93,000 tons respectively. On May 31, 1914, the unfilled tonnage was 3,998,160, making the showing this year 266,438 tons better than last year's. The following table shows the unfilled tonnage for each month beginning with the high point of December 31, 1912:

May 31, 1915.....	4,264,598	February 28, 1914.....	5,026,440
April 30, 1915.....	4,162,244	January 31, 1914.....	4,613,680
March 31, 1915.....	4,255,749	December 31, 1913.....	4,282,108
February 28, 1915.....	4,345,374	November 30, 1913.....	4,396,347
January 31, 1915.....	4,248,671	October 31, 1913.....	4,513,767
December 31, 1914.....	3,836,643	September 30, 1913.....	5,003,785
November 30, 1914.....	3,324,592	August 31, 1913.....	5,223,468
October 31, 1914.....	3,461,097	July 31, 1913.....	5,399,356
September 30, 1914.....	3,787,667	June 30, 1913.....	5,807,317
August 31, 1914.....	4,213,331	May 31, 1913.....	6,324,322
July 31, 1914.....	4,158,589	April 30, 1913.....	6,978,762
June 30, 1914.....	4,032,857	March 31, 1913.....	7,468,956
May 31, 1914.....	3,998,160	February 28, 1913.....	7,656,714
April 30, 1914.....	4,277,068	January 31, 1913.....	7,827,368
March 31, 1914.....	4,653,825	December 31, 1912.....	7,932,164

Sprague Electric Club

The members of the commercial and manufacturing departments of the Sprague Electric Works of the General Electric Company recently met at the Hotel Marlborough, New York, for dinner and organized the Sprague Electric Club. It will be the purpose of this society to bring the salesmen, engineers, factory heads and other employees into closer personal contact and co-operation. The club adopted a constitution and by-laws and elected a board of governors and officers, and plans were tentatively formulated for a series of meetings and events which are destined to stimulate the interest of the members in the new association.

The Iron and Metal Markets

RAILROAD DEMAND GROWS

Rail, Car and Locomotive Orders

France and Russia Still Buying—Higher Prices for Bars, Plates, Shapes and Boiler Tubes

Betterment both in sentiment and in orders is reflected in the week's developments in the steel market. As has been the case for some weeks, reports from Pittsburgh and Youngstown are more buoyant than those from Chicago or the East.

With output for three weeks at 80 per cent. of rated capacity, the Steel Corporation's Central Western plants are now receiving orders in excess of shipments. Predictions are made of a considerable increase in June upon the unfilled order increment of May, which was 100,000 tons on an average production for the month below 75 per cent. of capacity.

It is noteworthy that with war business commonly credited with so much of the steel trade's activity, domestic railroad demand should assume larger proportions; the more so, since this expansion comes just as car and locomotive works and rail mills are getting the largest export orders they have had in many months.

Rail and car orders continue to come from Russia and France. In the past week France has placed 3745 cars in the United States and Canada, including 2000 10-ton box cars and 1000 20-ton flat cars. Its rail orders to the Steel Corporation may have totaled 50,000 tons in the past three months, but there has been no recent order for that amount, as just reported. Of Russia's rail orders, 13,000 tons went to Chicago for rolling in the past week and 4000 tons to Pittsburgh. Russia's standard car order was for 13,000, and 75,000 tons of steel has just been placed at Pittsburgh for 7000 of these. As a climax there are the Russian contracts for 400 locomotives, of which at least 350 come to this country.

Domestic rail orders, in addition to 155,500 tons for the Pennsylvania Railroad (118,000 tons of 100-lb. and 37,500 tons of 125-lb.) awarded within the week, include 21,000 tons placed with the Ensley mill by the receivers of the St. Louis & San Francisco, and 2300 tons more for the Burlington. The Algoma mill, which contrary to predictions did not figure in the Pennsylvania award, has sold 700 tons to the Green Bay & Western Railroad at \$28 on dock at Green Bay, Wis. From Cuba a 7000-ton rail inquiry has come up this week.

The Rock Island order for 4000 cars is expected to be given out within a day or two.

The tightening of the bar situation and the increase in car orders have led two Pittsburgh producers of bars, plates and shapes to advance prices to 1.25c., anticipating by two weeks the date scheduled for that level. Sales have been made for some

time at 1.20c. for third quarter delivery. On implement bar contracts 1.15c. and 1.20c. have both figured as the basis for the second half of the year and more of this business is now covered than has been understood.

An advance of \$2 a ton has been made in lap-weld steel boiler tubes, and iron tubes are correspondingly higher.

Five cents for No. 28 galvanized sheets is prohibitive for some uses, but that is now the usual minimum. Long terne sheets as well as painted black sheets are offered as substitutes. Failures to carry out sheet contracts based on 8c. spelter have caused an upheaval in the trade.

At Pittsburgh some mills are sold to capacity on sheet bars and billets for most of the third quarter and one order for 2000 tons of sheet bars for England was transferred to Chicago. Pittsburgh and Youngstown mills are firmer on all semi-finished products.

Plate mills are taking courage from the improvement in car orders and the remarkable outlook for shipyards. The Standard Oil Company has bought 10,000 tons of plates from an Eastern mill. Plates figured largely in a 4000-ton order from Japan just placed at Chicago.

Basic pig iron has been more active at Pittsburgh. A sale of 9000 tons was made to an eastern Pennsylvania steel plant and on a 6000-ton purchase as high as \$12.65 at Valley furnace was paid, representing 15 cents advance. A 10,000-ton inquiry for basic is pending in the same market.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month and one year previous

	June 16,	June 9,	May 19,	June 17,
Pig Iron, Per Gross Ton:	1915.	1915.	1915.	1914.
No. 2 X, Philadelphia...	\$14.25	\$14.25	\$14.25	\$14.75
No. 2, Valley furnace...	12.75	12.75	12.75	13.00
No. 2 Southern, Cin'tl...	12.40	12.40	12.40	13.50
No. 2, Birmingham, Ala...	9.50	9.50	9.50	10.25
No. 2, furnace, Chicago*	13.00	13.00	13.00	13.50
Basic, del'd, eastern Pa...	13.50	13.50	13.25	14.00
Basic, Valley furnace...	12.65	12.50	12.50	13.00
Bessemer, Pittsburgh...	14.70	14.70	14.55	14.90
Malleable Bess., Ch'go*	13.00	13.00	13.00	13.75
Gray forge, Pittsburgh...	13.35	13.45	13.45	13.65
L. S. charcoal, Chicago...	15.75	15.75	15.75	15.75

Billets, etc. Per Gross Ton:				
Bess. Billets, Pittsburgh...	20.50	20.00	20.00	19.50
O.-h. billets, Pittsburgh...	20.50	20.00	20.00	19.50
O.-h. sheet bars, P'gh...	21.50	21.00	21.00	20.50
Forging billets, P'gh...	26.00	26.00	26.00	25.00
O.-h. billets, Phila...	22.02	22.02	22.02	22.40
Wire rods, Pittsburgh...	25.00	25.00	25.00	24.50

Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia...	1.17½	1.17½	1.17½	1.17
Iron bars, Pittsburgh...	1.25	1.25	1.20	1.25
Iron bars, Chicago...	1.20	1.20	1.15	1.05
Steel bars, Pittsburgh...	1.20	1.20	1.20	1.10
Steel bars, New York...	1.369	1.369	1.369	1.26
Tank plates, Pittsburgh...	1.15	1.15	1.15	1.10
Tank plates, New York...	1.319	1.319	1.319	1.26
Beams, etc., Pittsburgh...	1.20½	1.20½	1.20	1.10
Beams, etc., New York...	1.369	1.369	1.369	1.26
Skelp, grooved steel, P'gh	1.13	1.15	1.15	1.15
Skelp, sheared steel, P'gh	1.20	1.20	1.20	1.20
Steel hoops, Pittsburgh...	1.30	1.30	1.25	1.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	June 16, 1915.	June 9, 1915.	May 19, 1915.	June 17, 1914.
Sheets, Nails and Wire,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	1.75	1.75	1.80	1.80
Galv. sheets, No. 28, P'gh.	5.00	4.50	3.60	2.75
Wire nails, Pittsburgh...	1.55	1.55	1.55	1.50
Cut nails, Pittsburgh...	1.55	1.55	1.55	1.55
Fence wire, base, P'gh...	1.35	1.35	1.35	1.30
Barb wire, galv., P'gh...	2.40	2.40	2.10	1.90

Metals,

	Cents.	Cents.	Cents.	Cents.
Per Lb. to Large Buyers:				
Lake copper, New York...	22.50	22.50	21.00	14.12½
Electrolytic copper, N. Y.	20.37½	19.62½	18.75	13.87½
Spelter, St. Louis...	21.50	26.00	15.25	4.95
Spelter, New York...	22.00	26.50	15.50	5.10
Lead, St. Louis...	7.00	5.87½	4.12½	3.80
Lead, New York...	7.00	6.00	4.20	3.90
Tin, New York...	42.25	40.00	33.25	30.05
Antimony, Hallett's, N. Y.	none	none	none	5.87½
Tin plate, 100-lb. box, P'gh.	\$3.10	\$3.10	\$3.15	\$3.30

Coke, Connellsville,

	Cents.	Cents.	Cents.	Cents.
Per Net Ton at Oven:				
Furnace coke, prompt...	\$1.00	\$1.50	\$1.50	\$1.75
Furnace coke, future...	1.75	1.65	1.65	1.85
Foundry coke, prompt...	2.00	2.00	2.00	2.30
Foundry coke, future...	2.25	2.25	2.15	2.50

Old Material,

	Cents.	Cents.	Cents.	Cents.
Per Gross Ton:				
Iron rails, Chicago...	12.25	12.25	11.75	12.75
Iron rails, Philadelphia...	15.00	15.00	15.00	15.00
Carwheels, Chicago...	10.25	10.00	9.75	11.50
Carwheels, Philadelphia...	11.50	11.50	11.50	11.25
Heavy steel scrap, P'gh...	11.75	11.75	11.75	11.50
Heavy steel scrap, Phila.	11.00	11.00	11.50	10.50
Heavy steel scrap, Ch'go	9.25	9.50	9.50	9.75
No. 1 cast, Pittsburgh...	12.25	12.00	12.00	11.50
No. 1 cast, Philadelphia...	12.25	12.25	12.25	12.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	9.75

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal has no stability, being dependent on vessel charges.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c. base net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Products.—Prices to jobbers. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots, annealed, \$1.35; galvanized, \$2.15. Galvanized barb wire and staples, \$2.40; painted, \$1.60. Wire nails, \$1.55. Galvanized nails, 1 in. and longer, \$1.50 advance over base price; shorter than 1 in., \$2 or more advance over base price. Woven wire fencing, 69 per cent. off list for carloads; 68 off for 1000-rod lots; 67 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	\$1.50	\$1.55	\$1.60	\$1.65	\$1.75	\$1.85	\$1.95	\$2.05
Galvanized	2.30	2.35	2.40	2.45	2.55	2.65	2.95	3.05

Wire Rods.—Bessemer, open-hearth and chain rods, \$25.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.20c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from June 1, 1915, all full weight:

Butt Weld			
Inches	Steel	Black	Galv.
1, 1½ and 2	72	46½	64
2½ to 3	76	59½	64
3½ to 4	79	63½	68
4½ to 5			71
5½ to 6			71
6½ to 7			71
7½ to 8			71
8½ to 9			71
9½ to 10			71
10½ to 11			71
11½ to 12			71
12½ to 13			71
13½ to 14			71
14½ to 15			71
15½ to 16			71
16½ to 17			71
17½ to 18			71
18½ to 19			71
19½ to 20			71
20½ to 21			71
21½ to 22			71
22½ to 23			71
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25½ to 26			71
26½ to 27			71
27½ to 28			71
28½ to 29			71
29½ to 30			71
30½ to 31			71
31½ to 32			71
32½ to 33			71
33½ to 34			71
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36½ to 37			71
37½ to 38			71
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193½ to 194			71
194½ to 195			71
195½ to 196			71
196½ to 197			71
197½ to 198			71
198½ to 199			71
199½ to 200			71

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, in effect from June 15, 1915, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1½ and 2 in.	64
2½ in.	61
2½ and 3 in.	67
3 and 3½ in.	72

from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets	
	Cents per lb.
Nos. 3 to 8.....	1.25 to 1.30
Nos. 9 to 10.....	1.30 to 1.35
Nos. 11 and 12.....	1.35 to 1.40
Nos. 13 and 14.....	1.45 to 1.50
Nos. 15 and 16.....	1.55 to 1.60

Box Annealed Sheets, Cold Rolled	
	Cents per lb.
Nos. 10 and 11.....	1.40 to 1.45
No. 12.....	1.40 to 1.45
Nos. 13 and 14.....	1.45 to 1.50
Nos. 15 and 16.....	1.50 to 1.55
Nos. 17 to 21.....	1.55 to 1.60
Nos. 22 and 24.....	1.60 to 1.65
Nos. 25 and 26.....	1.65 to 1.70
No. 27.....	1.70 to 1.75
No. 28.....	1.75 to 1.80
No. 29.....	1.80 to 1.85
No. 30.....	1.90 to 1.95

Galvanized Sheets of Black Sheet Gauge	
	Cents per lb.
Nos. 10 and 11.....	4.00 to 4.50
No. 12.....	4.10 to 4.60
Nos. 13 and 14.....	4.10 to 4.60
Nos. 15 and 16.....	4.20 to 4.70
Nos. 17 to 21.....	4.35 to 4.85
Nos. 22 and 24.....	4.55 to 4.95
Nos. 25 and 26.....	4.70 to 5.20
No. 27.....	4.85 to 5.35
No. 28.....	5.00 to 5.50
No. 29.....	5.10 to 5.60
No. 30.....	5.25 to 5.75

Pittsburgh

PITTSBURGH, PA., June 15, 1915.

The most encouraging feature of the situation is that several of the larger steel companies report orders in excess of shipments, although the latter are heavier than at any time in more than a year. For the first time in some months steel-making pig iron is more active, particularly basic. A shortage in supply of open-hearth steel seems likely before long, and prices here and in the Youngstown district are very firm. New inquiry for billets and sheet bars is heavy, consumers being anxious to cover as far ahead as possible. The Carnegie and Jones & Laughlin steel companies have withdrawn the 1.20c. price on plates, shapes and bars and are now quoting 1.25c. for third quarter. Bars and shapes are firmer than plates. The spelter situation has resulted in galvanized sheets being sold in limited quantities at 5c. and higher for No. 28. The demand for coke is a little better and prices are slightly higher. A shortage of labor in the coke regions is cropping up, and some producers will not sell for the remainder of the year. The scrap market still lags, with prices showing no tendency to advance in the near future.

Pig Iron.—The local market has been more active and some good sized lots have been sold, mostly basic. A local interest reports a sale of 9000 tons of basic—1500 tons a month from July to December—to an Eastern consumer at \$12.80, Shenango Valley furnace. This apparently high price is explained by the statement that this iron will run lower in phosphorus than the usual basic analysis, and also because the deliveries run up to the close of the year. We also note sales of 5000 to 6000 tons of basic for delivery over the next two or three months at \$12.60 to \$12.65; also 5000 tons of No. 2 foundry for delivery over second half of the year at \$12.75, and 1000 tons of No. 2 for July and August at \$12.75, all Valley furnace. The Westinghouse Air Brake Company and Union Switch & Signal Company together have bought about 3000 tons of Northern forge iron at a price under \$12.50, Valley furnace, and about 4000 tons of malleable Bessemer and foundry iron at prices slightly under what is supposed to be the general market. We also note a sale of 1000 tons of basic at \$12.75 and 2000 tons of Bessemer for July, August, September, at \$13.75, Valley furnace. The Colonial Steel Company, Colona, Pa., is in the market for 10,000 tons of basic for delivery over the last half of the year. We quote: Bessemer iron, \$13.75; malleable Bessemer, \$12.60 to \$12.75; No. 2 foundry, \$12.75; basic, \$12.65 for July and August, and \$12.75 to \$12.80 for delivery over second half of the year; gray forge, \$12.40 to \$12.50, all at Valley furnace, with a freight rate of 95c. per ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—On a recent inquiry in the market for 15,000 tons of sheet bars for third quarter delivery, a local interest refused to quote, being sold up, so that if the business is placed it will likely go to Youngstown mills. Consumers are anxious to cover on steel as far ahead as possible, believing that prices in the third quarter will be higher than they are now. We quote: Bessemer and open-hearth billets, \$19.50, and Bessemer and open-hearth sheet bars, \$20, f.o.b. maker's mill, Youngstown; Bessemer and open-hearth billets, \$20.50 to \$21, and Bessemer and open-hearth sheet bars, \$21.50 to \$22, f.o.b. Pittsburgh. Forging billets are quoted at \$26 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and lighter carbons. Forging billets running above 0.25 to 0.60 carbon take \$1 per ton extra. Axle billets are held at \$22.

Ferroalloys.—Prices on ferromanganese are higher and more inquiry has come out than for some time. The minimum price on 80 per cent. English ferromanganese is now \$100, seaboard, and we note sales of about 800 tons at this price, part for prompt shipment and the remainder for forward delivery. English makers give no guarantee as to when deliveries will be made. We note sales of three or four carloads of 50 per cent. ferrosilicon at the full price of \$73, delivered. We quote 50 per cent. ferrosilicon in lots up to 100 tons, at \$73; over 100 tons to 600 tons, \$72; and over 600 tons, \$71, delivered in the Pittsburgh district. We quote 10 per cent. ferrosilicon at \$17; 11 per cent., \$18; 12 per cent., \$19, all f.o.b. cars at furnace, Ashland, Ky., Jackson or New Straitsville, Ohio, each of these points having a rate to Pittsburgh of \$2 per gross ton. We quote 20 per cent. spiegeleisen at \$25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads, 10c. in 2000-lb. lots and over, and 12½c. in smaller lots.

Structural Material.—Inquiry is more active. The American Bridge Company has taken 1200 tons for new steel buildings for the B. F. Goodrich Tire Company, Akron, Ohio, and 600 tons for new steel buildings for the Aluminum Company of America, New Kensington, Pa.; the McClintic-Marshall Company, 900 tons for a new steel building for the Standard Steel Car Company, Butler, Pa., to replace a structure destroyed by fire some time ago, and the Massillon Bridge Company, 175 tons of bridge work for the Baltimore & Ohio Railroad. The Carnegie and Jones & Laughlin steel companies have withdrawn the 1.20c. price on shapes and are now quoting 1.25c. for delivery in third quarter.

Plates.—The Pressed Steel Car Company has placed orders with the Carnegie Steel Company for about 75,000 tons of plates and shapes for the 7000 cars it will build for Russia, referred to in this report last week. No important orders for steel cars have since been given out, and inquiry is light. The mills will not start to roll the plates and shapes for the cars for the Pennsylvania Railroad until late in July or early in August. We quote ¼-in. and heavier plates for June delivery at 1.15c. to 1.20c., f.o.b. Pittsburgh. The Carnegie and Jones & Laughlin steel companies, also several other mills, are quoting plates at 1.25c. for third quarter.

Steel Rails.—The tentative allotment of the Pennsylvania Railroad order for 155,500 tons of rails is as follows: Carnegie and Illinois steel companies, 69,700 tons; Cambria, 34,850 tons; Pennsylvania, 34,850 tons; Lackawanna, 8050 tons, and Bethlehem, 8050 tons. The order consists of 118,000 tons of 100-lb. and 37,500 tons of 125-lb. The 125-lb. rails will be rolled by the Cambria and Pennsylvania companies, as the Carnegie Company is not equipped as yet to roll such sections, but will be later this year. The 125-lb. rails are all to be used on the lines east of Pittsburgh, so that none of these sections will be rolled at Chicago. The allotment as given is subject to slight change. While nothing has been given out as to the extra paid over the regular price, it is said to have been about \$2 per ton. No other large inquiries for standard sections are in the market, but there are several fairly large foreign inquiries both for standard sections and light rails. One inquiry is from France for 6000 tons of light rails, also for 2000 to 2500 tons of girder rails. The new demand for light rails is active, mostly from the coal mining and traction companies. The Carnegie Com-

pany entered new orders and received specifications last week for close to 4000 tons of light rails. We quote standard section rails of Bessemer stock at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10 lb. section, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. The prices of light rails are materially shaded on large lots.

Sheets.—It is impossible to quote the market accurately on galvanized sheets. The American Sheet & Tin Plate Company has sold them from stock to regular customers for prompt shipment at 5c. for No. 28, while other makers report sales as high as 5.50c. The market on spelter has declined slightly in the last few days, and the belief is that it will go down still further. Many former consumers of galvanized sheets are now buying heavier gauges of black. The new demand for black and blue annealed sheets is fairly active and specifications are good. A local concern received specifications in one day recently for over 6000 tons of sheet mill products. We quote No. 28 Bessemer black sheets at 1.75c. to 1.80c.; No. 28 galvanized, 5c. to 5.50c.; Nos. 9 and 10 blue annealed sheets, 1.30c. to 1.35c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Tin Plate.—Foreign inquiry is getting heavier and comes from numerous countries. One inquiry, supposed to be for France, is for 100,000 boxes and others are for 25,000 to 50,000 box lots. The domestic demand is stronger and the tin plate mills now have more business ahead on specifications and new orders than for some time. One large domestic inquiry for upward of 250,000 boxes is said to be pending. On new orders we quote 14 x 20 coke plates at \$3.10 to \$3.25 per base box, but on a very desirable specification it is probable that the lower price could be shaded.

Wire Rods.—In this branch foreign inquiry is also quite active. Shipments are still being made on foreign contracts for wire rods taken some months ago. The domestic demand is also brisk and two local rod makers state they are pretty well filled for the remainder of this year. All the rod mills in the Pittsburgh district are reported operating to 100 per cent. of capacity. We quote Bessemer, open-hearth and chain rods at \$25 to \$26, f.o.b. Pittsburgh, for domestic business, while higher than \$26 has been obtained for foreign shipment.

Carwheels.—The Carnegie Steel Company states that its Schoen works, where it makes carwheels, is practically filled for the remainder of this year, having shared liberally in the order for carwheels of the Pennsylvania Railroad car order. The Schoen works has a capacity for turning out 1000 to 1200 carwheels per day. We quote standard 33-in. freight carwheels 6¼ in. rough bore at \$16, and standard 36-in. passenger, the same bore, at \$22.50 per wheel, f.o.b. Pittsburgh.

Shafting.—The new demand for shafting is heavy, coming from the screw stock machine people and automobile builders. The concerns making shafting in this district are running to 100 per cent., and report they are taking new orders actively. On contracts for last half of the year, 68 per cent. seems to be the minimum price quoted, but on very desirable orders for prompt shipment 69 to 70 per cent. might be done, although the market seems to be pretty firmly established at 68 per cent. On small lots the discount is about 63 per cent. off, all f.o.b. Pittsburgh.

Railroad Spikes.—The order of the Pennsylvania Lines West for about 10,000 kegs of standard sizes has been divided about equally between Dilworth, Porter & Co., Ltd., this city, and the Illinois Steel Company. Prices are firmer, and local makers are now quoting \$1.40 minimum per 100 lb., and \$1.50 on small railroad and boat spikes, in carload and larger lots, f.o.b. Pittsburgh.

Hoops and Bands.—Last week the Carnegie Steel Company withdrew its 1.20c. price on bands and is now

quoting 1.25c. for third quarter. The mills have a large amount of business on their books for delivery in third quarter, most of it taken at about 1.20c. Specifications against contracts for steel hoops are more active than for some time. We now quote steel bands at 1.25c., for delivery in the third quarter, with extras as per the steel bar card, and steel hoops at 1.30c. to 1.35c., f.o.b. Pittsburgh.

Skelp.—Mills report a heavier demand for skelp than for some time. Prices are firm and likely to be higher in the near future. We quote grooved steel skelp at 1.15c. to 1.20c.; sheared steel skelp, 1.20c. to 1.25c.; grooved iron skelp, 1.50c. to 1.55c.; sheared iron skelp, 1.60c. to 1.65c., all delivered in the Pittsburgh district.

Wire Products.—Foreign inquiry for barb wire is heavy, and mills are turning down business offered to them, not being able to make the deliveries wanted. Local makers say they are pretty well filled through the third quarter and into fourth quarter. On galvanized products makers are very careful in quoting, one company insisting that all inquiries be submitted to the home office. The full differential of 80c. on galvanized products is being obtained, and this may be higher in the near future. There is a fair domestic demand for wire nails, and specifications against contracts are still coming in actively. To jobbers on new orders mills quote: Wire nails, \$1.55; galvanized nails, 1 in. and longer taking an advance over this price of \$1.50, and shorter than 1 in., \$2 or more. Plain annealed wire is \$1.35 to \$1.40; galvanized barb wire and fence staples, \$2.40; painted barb wire, \$1.60; all f.o.b. Pittsburgh, with freight added to point of delivery, terms 30 days net, less 2 per cent. off for cash in 10 days. Prices on woven wire fencing are higher, and it is now quoted at 69 per cent. off in carload lots, 68 per cent. on 1000-rod lots, and 67 per cent. on small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Late last week the Carnegie and Jones & Laughlin steel companies withdrew the price of 1.20c. on steel bars and are now quoting 1.25c. minimum for third quarter. It is stated that a number of the implement makers have closed on their requirements for steel bars for last half of the year at 1.20c., f.o.b. Pittsburgh. One leading local maker of steel bars claims to have persistently refused to accept contracts from implement makers beyond second half of the year delivery, and to have made no sales into next year. The current demand for steel bars is active, and shipments by the mills are very heavy; in fact the larger makers are back in deliveries three to four weeks. The new demand for common iron bars and also for steel bars for reinforcing purposes is active. We quote steel bars at 1.25c. for third quarter; common iron bars, 1.25c. to 1.30c., and test iron bars, 1.35c., f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—The domestic demand is active, and makers report specifications against contracts are coming in freely. Several foreign inquiries are being figured on. Prices are firm. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., \$2.75, delivered. Extras, which are standard among all the mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier.....	Base	\$0.25	\$0.10
0.099 to 0.059.....	\$0.05	0.25	0.15
0.049 to 0.035.....	0.20	0.25	0.15
0.034 to 0.031.....	0.35	0.40	0.25
0.030 to 0.025.....	0.45	0.40	0.40
0.024 to 0.020.....	0.55	0.40	0.50
0.019 to 0.017.....	0.85	0.50	1.10
0.016 to 0.015.....	1.25	0.50	1.10
0.014 to 0.013.....	1.95	0.50	1.25
0.012.....	2.30	0.50	coils only
0.011.....	2.65	0.50	coils only
0.010.....	3.00	0.50	coils only

Merchant Steel.—New demand is heavier than for some months, and specifications against contracts are active. One leading mill reports its new orders and shipments heavier than at any time in more than a year. Prices are firm and in small lots are as follows: Iron finished tire, ½ x 1½ in. and larger, 1.40c., base; under ½ x 1½ in. 1.55c.; planished tire, 1.60c.; channel tire, ¾ to 1 in. and 1 in., 1.90c. to 2c.; 1½ in. and larger,

2c.; toe calk, 2c. to 2.10c.; base; flat sleigh shoe, 1.75c.; concave and convex, 1.80c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.80c.

Rivets.—Makers report the demand for boiler and structural rivets, especially the former, heavier now than at any time in more than a year. Prices are firmer. We quote structural rivets at \$1.50, and conehead boiler rivets at \$1.60 per 100 lb. in carload lots, f.o.b. Pittsburgh, smaller lots bringing from 5c. to 10c. advance, depending on the order.

Nuts and Bolts.—Specifications against contracts are coming in more freely than for some time, while the new demand is active. Shipments are heavy. Discounts in large lots are as follows:

U. S. S. Cold Punched Blank and Tapped, Chamfered, Trimmed and Reamed

½ in. and smaller, hex.....8.1c. per lb. off
¾ in. and larger, hex.....7.3c. per lb. off
Square, all sizes.....5.8c. per lb. off

Semi-Finished Tapped

½ in. and smaller hex.....85-10-10-10 off
¾ in. and larger hex.....85-10-10 off

Black Bulk Rivets

7/16 x 6½, smaller and shorter.....80-10-5 off

Package Rivets 1000 Pcs.

Black, metallic tinned and tin plated....75-10-10 off

Discounts on bolts as recently adopted are as follows:

Common carriage bolts, ¾ x 6, S & S rolled, 80-5; cut 80; larger or longer, 75-5. Machine bolts, h. p. nuts, ¾ x 4, S & S rolled, 80-5; cut, 80; larger or longer, 75-2/10. Machine bolts with C. P. & C & T nuts, ¾ x 4, S & S, 75-2/10; larger or longer, 75. Bolts without nuts, 6 in. and shorter extra 10%; longer lengths, extra 5%. G. P. coach screws, 75-2/10-5. Nuts, blank or tapped, h. p. square, 6.20; hexagon, 7.10. C. P. C & T square, 5.80; hex, ¾ in. and up, 7.30; smaller, 8.1. C. P. plain, square, 5.30; hexagon, 5.70. C. P., semi-fin. hex., ¾ and up, 85-3/10; smaller, 85-2/10.

Wrought Pipe.—Orders booked in June will likely show an increase over May, as the new demand for wrought-iron and steel pipe is steadily getting heavier. The Kansas Natural Gas Company is figuring on extending its lines if the courts will allow it to charge consumers higher rates for gas. Discounts on iron and steel pipe, given on a previous page, are fairly well held.

Boiler Tubes.—Effective Tuesday, June 15, discounts on lap-welded steel boiler tubes and on charcoal-iron tubes were lowered one point, equal to an advance of about \$2 a ton. The new discounts are printed on a previous page.

Coke.—Several large inquiries for furnace coke for delivery in second half of this year, aggregating 40,000 to 50,000 tons per month, are in the market. Prices on furnace coke for prompt shipment and for second half delivery are firmer. We note a sale of 200 cars of prompt furnace coke at \$1.60 per net ton at oven, and for second half \$1.75 is generally quoted. Several producers are refusing to name prices on furnace coke for second half delivery, as a shortage in labor is almost sure to develop, which is expected to put prices up. It is stated that the Frick Coke Company had trouble in getting enough men to draw its coke on Tuesday morning of this week. There is a fair inquiry for foundry coke and prices are firm. We quote best grades of furnace coke for spot shipment at \$1.55 to \$1.60, and for delivery over remainder of the year at \$1.75 per net ton at oven. We quote best makes of 72-hr. foundry coke for prompt shipment at \$2 to \$2.25, and on contracts for remainder of the year from \$2.25 to \$2.50 per net ton at oven, although some grades can be had at lower prices. The Connellsville Courier reports the output of coke in the upper and lower Connellsville regions for the week ended June 5 as 314,897 net tons, a decrease over the previous week of about 2000 tons.

Old Material.—The scrap market is not yet showing the improvement either in demand or prices that was expected. Two of the largest local consumers report they are congested with scrap, but on the other hand are said to be buying direct from mills that make scrap. Recently a Youngstown consumer bought 5000 tons of borings at the reported price of \$9 delivered, and this has firmed up the local market on borings to some extent. There is a good demand for low-phosphorus melt-

ing stock and prices are firm. We note sales of 6000 to 8000 tons of selected heavy steel scrap to consumers in the Pittsburgh and Youngstown districts at \$11.75 to \$12 delivered. For delivery in Pittsburgh and nearby districts that take Pittsburgh freights, dealers quote about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery.....	\$11.75
Compressed side and end sheet scrap.....	\$10.25 to 10.50
No. 1 foundry cast.....	12.25 to 12.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district.....	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock.....	10.50 to 10.75
Railroad grate bars.....	8.50 to 8.75
Low phosphorus melting stock.....	15.25 to 15.50
Iron car axles.....	18.75 to 19.25
Steel car axles.....	13.25 to 13.75
Locomotive axles, steel.....	19.75 to 20.25
No. 1 busheling scrap.....	10.25 to 10.50
No. 2 busheling scrap.....	7.25 to 7.50
Machine shop turnings.....	8.00 to 8.25
Old carwheels.....	11.75 to 12.00
Cast-iron borings.....	8.50 to 8.75
*Sheet bar crop ends.....	12.00 to 12.25
Old iron rails.....	12.75 to 13.00
No. 1 railroad wrought scrap.....	10.75 to 11.00
Heavy steel axle turnings.....	8.50 to 8.75
Heavy breakable cast scrap.....	10.75 to 11.00

*Shipping point.

Chicago

CHICAGO, ILL., June 16, 1915—(By Wire).

Slowly the Western market is attaining higher price levels and heavier mill schedules. The Russian Government has successfully arranged the financing of its rail and car orders, which enables 13,000 tons of rails to be entered for rolling this week by local mills. For Japan 4000 tons of heavy plates, shapes and bars were placed at Chicago last week. The mills of the leading interest at Pittsburgh being practically sold up on sheet bars and billets, 2000 tons for Great Britain will be rolled here, to be followed in all probability by an additional 4000 tons, on which prices are now being taken. An order for 300 tons of billets for a tube mill at Pittsburgh now being filled here is an index to the situation. One of the leading producers of steel bars in the Pittsburgh district has orders that will engage practically its full open-hearth steel capacity for 12 weeks to come; hence its attitude at Chicago on implement bar contracts is a reflection of that position. The leading interest, predicated its position very largely upon the situation at Pittsburgh, has advanced its quotation in this market to 1.25c., Pittsburgh, for the third quarter and 1.30c. for the fourth quarter on bars and shapes. Other than for structural steel, of which 3500 tons is reported placed last week, 16,000 tons released for fabrication and 30,000 tons to be awarded before the close of the month, the demands normally tributary to this market have had little to do with its growing strength. There is still a dearth of plate orders, although the accumulation of small lots shows a larger aggregate from week to week and prices are on a slightly better basis. Implement bars to which a traditional importance attaches that is out of proportion to actual tonnages specified in recent years are being placed under contract, for the most part of 1.20c., Pittsburgh, for the last half of this year. That there will be some exceptions to these terms is not denied. Mill orders for galvanized sheets can still be placed, one quotation being on the basis of 5c., Pittsburgh, for No. 28, with special differentials for other gauges. Local warehouses doubtless furnish the most complete stocks of galvanized sheets now available, and the price of 4.85c. is being continued for orders in any quantity. New business in pig iron is developing no tonnages of importance, but previous sales and the free shipment of iron against contracts support a firm attitude on the part of the furnaces, both here and in the South. The Burlington has bought an additional 2300 tons of rails.

Pig Iron.—The pig-iron market is passing through one of the familiar intervals when no special incentive to buying can be found except in individual or special instances. Inquiry is light for all grades of iron, and while, as always, there is some business being placed, buying does not represent a covering of any particular

period. The market offers practically no evidence of special eagerness to sell, which might be construed as weakness, although the prices applicable to various grades of charcoal iron are not being uniformly quoted by all producers. Lake coke irons are being held firmly at \$13 for all forward business. The usual quotation for iron from the South seems to be \$9.75, Birmingham, where silicon runs 2.25 per cent. and over. Exceptions to this level appear to be traceable either to prices made on small lots for immediate shipment or spot iron. Quotations of \$9.50 are known to have been made on iron running 1.75 per cent. and over in silicon. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$15.75
Lake Superior charcoal, No. 1.....	16.25
Lake Superior charcoal, No. 6 and Scotch.....	16.75
Northern coke foundry, No. 1.....	\$13.50 to 13.75
Northern coke foundry, No. 2.....	13.00 to 13.50
Northern coke foundry, No. 3.....	12.50 to 13.00
Southern coke, No. 1 f'dry and 1 soft.....	14.25 to 14.50
Southern coke, No. 2 f'dry and 2 soft.....	13.75 to 14.00
Malleable Bessemer.....	13.00 to 13.25
Standard Bessemer.....	16.50
Basic.....	12.50 to 13.00
Low phosphorus.....	20.00 to 20.50
Jackson Co. and Ky. silvery, 8 per cent.....	16.50 to 17.00
Jackson Co. and Ky. silvy, 10 per cent.....	17.50 to 18.00

(By Mail)

Rails and Track Supplies.—The exact tonnage of Pennsylvania rails to be rolled by the Illinois Steel Company has not yet been made known, although the expected quantity is 30,000 tons of the 100-lb. section. The Chicago, Burlington & Quincy has placed an order for 2300 tons of rails in addition to those provided for under previous contracts. The St. Louis & San Francisco has bought, it is understood, 21,000 tons from the Tennessee Coal, Iron & Railroad Company. A substantial inquiry, also, for track fastenings, with a number of sales, in quantity, is reported. The satisfactory arrangements, financially, with Russia, resulting last week in the release of 13,000 tons of rails at Chicago for rolling, will apply, presumably to other rail and car orders as well. We quote standard railroad spikes at 1.45c. to 1.50c., base; track bolts with square nuts, 1.90c., base, all in carload lots, Chicago; tie plates, \$23.25 to \$24.25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

Structural Material.—The outlook for structural steel is brighter in many respects. A lively competition is developing in connection with the approaches for the Free Bridge at St. Louis, where at least 24,000 tons are involved, the Burlington is now to proceed with the erection of the 16,000-ton bridge at Paducah, and a number of orders have been taken for smaller bridges on various railroads. The bridge at Kansas City, for which inquiry has been made by the Burlington, as reported last week, calls for about 6000 tons, of which a considerable proportion will be nickel steel. Other contracts reported include 540 tons for the Paducah & Illinois Railroad Company, taken by the Kenwood Bridge Company; 516 tons of girder spans for the Milwaukee Railroad, awarded to the Wisconsin Bridge & Iron Company; 700 tons for transmission towers for the Wisconsin River Power Company, placed with the American Bridge Company; 588 tons for the World-Herald building, Omaha, to be fabricated by the Morava Construction Company, together with other smaller jobs aggregating nearly 1100 tons. A rather sharp stiffening of the market has made its appearance, and while all companies have not changed their prices, the leading interest is now quoting on new contracts 1.25c., Pittsburgh, for the third quarter and 1.30c. for the fourth quarter. The market generally remains on the basis of 1.20c., Pittsburgh, with desirable specifications for prompt shipment on some sizes, bringing out even more favorable quotations. We quote for Chicago delivery of structural shapes from mill 1.389c.

Improvement is noted in the volume and activity of structural sales out of store, although the gains are made but slowly. We quote for Chicago delivery of structural steel out of stock 1.75c.

Plates.—Legal interference with the building of oil storage tanks in Oklahoma has deprived this market of what had been a steady flow of tank plates, but notwithstanding this the amount of business in sight seems to grow. An order for 4000 tons of steel placed last week at Chicago for shipment to Japan included a round tonnage of plates. The amount of business going on the books, while better, is not of itself sufficient to add very much strength in this market to the mill position in quoting, but the increasing scarcity of open-hearth steel has had an indirect influence, and extreme concessions on plates are not so easily obtained. Some quotations as high as 1.15c., Pittsburgh, are appearing, and it is stated that the practice of accepting specifications on contract extensions at 1.05c. is being discontinued. We quote for Chicago delivery of plates from mill 1.289c. to 1.339c.

We quote for Chicago delivery of plates from store 1.75c.

Sheets.—Something of the seriousness of the galvanized sheet situation from the mill standpoint is apparent from the difficulties in which several of the sheet makers are finding themselves. On the one hand they face repudiation of their contracts or losses in filling them, which will be more than difficult. Instances of heavy suits for damages for breach of contract are already reported. Galvanized sheets are still available, however, from some mills on a basis of 5c., Pittsburgh, for No. 28; 5.40c., for No. 29; 4.75c., for No. 26. These prices are on the one hand below the spelter equivalent and on the other are nearly prohibitive for the ordinary uses of galvanized sheets. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.489c.; No. 28 black, 1.889c. to 1.939c.; No. 28 galvanized, 5.15c. to 5.439c.

The position of Chicago as a warehousing center is again emphasized with respect to galvanized sheets, for the localities from which inquiry is coming to local jobbers indicate that a wider range of requirements can be filled here than elsewhere. During the week carload shipments have been made to Boston, to Virginia and to Arizona. The leading local stores are adhering to their policy by asking prices which, while generally representing the high level of the market, are still below a prohibitive limit. For No. 28 galvanized 4.85c. is being asked on any quantity. We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 4.85c.

Bars.—Orders for 2000 tons of sheet bars and billets for shipment to Great Britain and a round tonnage of standard bars to Japan were among the interesting bookings of the week. The rolling of 300 tons of billets for shipment to the Pittsburgh district also reflects the condition of the mills there, particularly with respect to open-hearth steel. Actual developments in the closing of implement bar contracts cannot be clearly traced. There is no doubt that the mills have been able to close numbers of contracts on the six-month basis, some without committing themselves regarding the first half of 1916, others by offering bars at \$1 advance, and, it is reported, by still others on the basis of promised protection. If any contracts are made for the full year at the one price they are certain to have a minimum of publicity. As nearly as the market is ever quotable on the basis of one price, 1.20c., Pittsburgh, represents the basis of contracts, and the extent to which the open-hearth capacity of a great many of the mills has already been sold up will limit concessions from that price to very exceptional cases. Quotations for reinforcing bars still evidence some weakness, the order for about 800 tons for the new Union freight terminal foundations being placed with a local mill at a price understood to be better than 1.15c., Pittsburgh. Bar-iron tonnage is still much below the capacity of local mills to produce. We quote for mill shipments as follows: Bar iron, 1.20c.; soft steel bars, 1.389c.; hard steel bars, 1.20c.; shafting, in carloads, 65 to 68 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.85c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes $\frac{3}{4}$ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off, and in carloads, 62 per cent. off.

Rivets and Bolts.—Contracting for rivets for the last half is as yet of no great consequence. One of the

mills has declined further to quote at the very low level recently prevailing and has advanced its price on structural rivets to the basis of 1.65c., Chicago. Contracting for bolts and nuts is progressing with considerable rapidity, and another week will doubtless see the situation well covered. For the most part, bolt contracts are also being limited to a period of six months. The prospect of the higher price-basis for new contracts is responsible for more liberal current specifications. Quotations are as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-15; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 80-15; cut thread, 80-10; larger sizes, 80; gimlet points coach screws, 85; hot pressed nuts, square, \$6.40 off per cwt.; hexagon, \$7.30 off per cwt. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 1.65c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to $\frac{3}{4}$ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to $\frac{3}{4}$ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, \$6, and hexagon, \$6.70 off per cwt.

Wire Products.—The quietness prevailing in the wire trade for a period of several weeks appears to have borne fruit in an accumulation of needs which created a greater activity during the week closed. This is particularly applicable to wire nails. Confusion exists in connection with the sale of galvanized wire products, in lesser degree, but with effects similar to those being experienced in the sheet trade. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, \$1.589; wire nails, \$1.739; painted barb wire, \$1.789; galvanized barb wire, \$2.539; polished staples, \$1.789; galvanized staples, \$2.539; all Chicago.

Cast-Iron Pipe.—The award of 300 tons at Milwaukee has been made to the leading interest. At Kenosha, Wis., bids on 2500 tons of 42-in. were opened June 14; on the 16th Cincinnati will buy 2000 tons of 36-in. and next week St. Louis will take figures on 2600 tons. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$25.50; 6 to 12 in., \$23.50; 16 in. and up, \$23, with \$1 extra for gas pipe.

Old Material.—An inactive scrap market, if at all prolonged, is synonymous with weaker prices. The contrast between the market position on scrap in the East and at Chicago is approximately parallel to the relative situations in these localities with respect to new material. Demand here for rolling-mill scrap is exceedingly limited, and steel scrap is being used in but little greater quantities. A sale of carwheels by a railroad on the basis of \$10, f.o.b. track at Chicago, is noted. Other offerings of railroad scrap include 1600 tons from the Soo Line, 2300 tons from the Northern Pacific, 700 tons from the Omaha, 1600 tons from the Chicago Great Western and 2400 tons from the Michigan Central. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	\$12.25 to \$12.50
Old steel rails, rerolling	10.25 to 10.75
Old steel rails, less than 3 ft.	10.00 to 10.50
Relaying rails	19.50 to 20.50
Old carwheels	10.25 to 10.50
Heavy melting steel scrap	9.25 to 9.75
Frogs, switches and guards, cut apart	9.25 to 9.75
Shoveling steel	9.00 to 9.25
Steel axle turnings	7.00 to 7.25

Per Net Ton

Iron angles and splice bars	\$11.50 to \$12.00
Iron arch bars and transoms	12.00 to 12.50
Steel angle bars	8.50 to 8.75
Iron car axles	13.50 to 14.00
Steel car axles	10.00 to 10.50
No. 1 railroad wrought	9.00 to 9.25
No. 2 railroad wrought	8.25 to 8.75
Cut forge	8.25 to 8.75
Steel knuckles and couplers	8.50 to 8.75
Steel springs	9.00 to 9.25
Locomotive tires, smooth	8.50 to 9.00
Machine shop turnings	5.25 to 5.75
Cast borings	5.00 to 5.50
No. 1 busheling	7.25 to 7.50
No. 2 busheling	6.00 to 6.50
No. 1 boilers, cut to sheets and rings	5.50 to 6.00
Boiler punchings	8.25 to 8.50
No. 1 cast scrap	9.00 to 9.25
Stove plate and light cast scrap	8.00 to 8.25
Grate bars	7.50 to 7.75
Railroad malleable	8.25 to 8.50
Agricultural malleable	7.25 to 7.50
Pipes and flues	6.25 to 6.75

Philadelphia

PHILADELPHIA, PA., June 15, 1915.

Opinions as to the actual state of the market vary considerably. Some find a pronounced betterment in demand, while others report none, and the conclusion to be reached is that there is no generally good demand for all products. Where the buying of war supplies has made itself felt there is more optimism than where it has not. Almost unanimous, however, is the feeling that a big future lies before the trade and that it may not be very distant is believed by some. The placing of the Pennsylvania Railroad's rail orders means a great deal to the mills concerned, but as a general stimulus it has been discounted by the long negotiations leading up to the actual distribution. A depressing feature with independent steel mills is the growing difficulty of securing ocean freight space. So many vessels have been sunk of late that owners are growing more wary of risking their ships. Some contracts for bars and shapes are being placed for delivery in the last half on the basis of 1.20c., Pittsburgh. The specifying of bars against contracts is proceeding at a good rate. The plate business is irregular, some mills maintaining the rate of production. Only small propositions have engaged the attention of makers of structural material, and fewer are coming out. Sheets do not gain in strength. The melting of pig iron is on the increase, though the improvement is irregular. Canada is eager to get low phosphorus pig iron for war needs.

Iron Ore.—Arrivals at this port in the week ended June 12 consisted of 10,710 tons from Cuba and 20,334 tons from Sweden.

Pig Iron.—The melt of foundry iron has increased, but there is much variance in the reports as to greater consumption. In some directions deliveries are being specified faster than contracts call for, while in other cases activity has not been sufficient to bring about such a result. As in other lines, the direct or indirect effect of the war business is a determining factor. The Trenton consumer referred to last week as in the market for 1000 tons of foundry grades has not closed. In basic there has been no large buying since the purchase of about 40,000 tons referred to last week, but at least two eastern Pennsylvania mills have inquiries out which must come to an issue. Pipe makers have taken routine lots, and the carwheel manufacturers are more active. The stove trade is quiet. In low phosphorus greater activity has prevailed, and at least 8000 or 9000 tons was sold in the week, a part of which will be shipped to Canada. Premiums are willingly paid by Canadians who have war contracts, as the bids they submit to their Government are based on the price which must be paid for pig iron. Southern iron has been exceptionally quiet in this district. The quotations for standard low phosphorus are decidedly stronger and selling for forward delivery is becoming much more restricted. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X, foundry	\$14.25 to \$14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia, No. 2 X, foundry	15.25 to 15.75
Virginia No. 2 plain	15.00 to 15.25
Gray forge	13.25 to 13.50
Basic	13.50 to 13.75
Standard low phosphorus	20.50 to 21.00

Ferroalloys.—Dealers continue to quote \$100, sea-board, for 80 per cent. ferromanganese, but have little to sell at that or any price. Reports are heard of offerings elsewhere at lower prices, but the deliveries involved are November and December. Inquiries for a few hundred tons have been made here. Last week 400 tons arrived at this port. Ferrosilicon, 50 per cent., is unchanged at \$71 to \$73, Pittsburgh, according to quantity.

Bars.—Specifications for current deliveries continue to come out in good volume, and most of the large consumers are going into the third and last quarter. The Virginian Railway has closed on 600 tons of steel bars. Quotations are unchanged at 1.359c., Philadelphia, on prompt business, and 1.409c. through the year. Iron bars are quoted at 1.17 $\frac{1}{2}$ c., Philadelphia, with the

demand irregular, some of the mills doing a better business than others.

Plates.—In this product, also, there is more or less irregularity in demand, inasmuch as one or two mills find the domestic demand dull. Export deals are more difficult to close, not so much because of unwillingness of foreign consumers to buy, but for the reason that cargo space is harder to secure. At the same time, the placing of orders for locomotives, and for merchant vessels with the Atlantic coast shipyards, is promising for the future. Quotations are unchanged at 1.309c. to 1.359c., Philadelphia, for this quarter, and \$1 per ton more for the third.

Rails.—Outside of the placing of the Pennsylvania Railroad's orders for 155,500 tons, the details of which are given elsewhere in this issue, there is nothing new of importance in this market. The inquiry of the Southern Railway for 6000 tons is still pending. The Chesapeake & Ohio is in the market for spikes, and other railroads are inquiring for miscellaneous track supplies.

Structural Material.—Conditions are quieter in the local field. One mill reports that the week was slower than the preceding one, and not up to last month, all of which is due to a lessening in the number of small propositions before the trade. The quotation for prompt delivery continues at 1.359c., Philadelphia. Contracts for the last half have been made at 1.409c.

Sheets.—Efforts to obtain 1.509c., Philadelphia, for No. 10 blue annealed sheets have not met with uniform success, and the market is described as ragged. The demand shows but little improvement and 1.459c. is commonly done.

Billets.—An important maker has found an increase in specifications against contracts, while another reports but little betterment. Exports are more difficult. The price quoted is \$22.02, based on \$19.50, Pittsburgh, but it may be shaded.

Coke.—Uncertainty over the future of the coke market continues to restrict the desire of pig-iron makers to sell far in advance at prevailing prices. At the same time no heavy buying on the part of furnaces is reported. Small lots of foundry coke are moving, and \$2.40 is paid for good grades. Quotations for prompt delivery furnace coke range from \$1.55 to \$1.60 per net ton at oven. Second-half furnace is quoted at \$1.75. Prompt foundry is quoted at \$2 to \$2.40 and contract at \$2.20 to \$2.50. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—There is little change in the market except that more inquiry is appearing and the feeling is that there must soon be better activity. The railroad lists which were closed last week went at good prices, with brokers doing most of the buying. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel	\$11.00 to \$11.25
Old steel rails, rerolling	11.50 to 12.00
Low phos. heavy melting steel scrap	14.75 to 15.25
Old steel axles	14.00 to 14.50
Old iron axles	17.50 to 18.00
Old iron rails	15.00 to 15.50
Old carwheels	11.50 to 12.00
No. 1 railroad wrought	13.00 to 13.25
Wrought-iron pipe	10.75 to 11.00
No. 1 forge fire	8.50 to 9.00
Bundled sheets	9.00 to 9.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	8.50 to 8.75
Cast borings	8.00 to 8.50
No. 1 cast	12.25 to 12.50
Grate bars, railroad	9.00 to 9.25
Stove plate	9.00 to 9.25
Railroad malleable	9.50 to 10.00

Boston

BOSTON, MASS., June 15, 1915.

Old Material.—Prices for foundry scrap have strengthened. The foundries which have orders growing out of the war are probably paying a little more for their scrap than others who find business dull, the question being one of bargaining. Otherwise, conditions are unchanged, except, as generally reported, improvement exists in the steel market. The quotations given below

are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	\$8.25 to \$8.50
Low phosphorus steel	13.75 to 14.75
Old steel axles	12.75 to 13.25
Old iron axles	20.25 to 20.75
Mixed shafting	12.00 to 12.25
No. 1 steel wrought and soft steel	8.25 to 8.75
Skeleton (bundled)	5.50 to 5.75
Wrought-iron pipe	7.00 to 7.50
Cotton ties (bundled)	5.25 to 5.75
No. 2 light	3.25 to 3.75
Wrought turnings	5.00 to 5.50
Cast borings	5.00 to 5.25
Malleable	7.50 to 7.75
Stove plate	7.00 to 7.50
Grate bars	5.25 to 5.50
No. 1 machinery cast (price to consumer)	13.00 to 13.50
No. 2 machinery cast (price to consumer)	11.50 to 12.00

Cincinnati

CINCINNATI, OHIO, June 16, 1915—(By Wire).

Pig Iron.—The southern Indiana inquiry mentioned last week developed into business, totaling about 3000 tons of foundry iron, 1500 tons of which was bought from Southern producers, and 700 tons each being allotted to Ironton and Chicago district furnaces. A small tonnage of Lake Superior charcoal iron was also contracted for, all for last half shipment. A central Ohio melter purchased 1000 tons of special Northern foundry iron, and another consumer in the same district took 1000 tons of standard Bessemer, the latter purchase being for third quarter. Specifications on contracts show an improvement over the corresponding period of last month, but there is yet some complaint as to holdups from a number of foundries not able to take care of their allotments. The small carload business is very quiet, and the only orders reported are those from consumers to fill urgent requirements. Pig-iron salesmen report that it is harder than usual to dig out orders, and that the amount of iron bought under cover is smaller than for a long time. The heavy contracting during part of April and May is in a measure responsible for this condition. While the majority of Southern furnaces are holding out for \$9.75, Birmingham basis, \$9.50 can be done with more than one interest for nearby shipment. The latest quotation from a few Southern furnaces for last half delivery is \$10, but no iron has been sold here at this figure, as far as known. It is rumored that some malleable business is in sight, but definite inquiries have not yet been issued. Northern foundry, malleable and basic are unchanged at \$12.50, Ironton basis, for either prompt or last half shipment. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	\$12.90 to \$13.40
Southern coke, No. 2 f'dry and 2 soft	12.40 to 12.90
Southern coke, No. 3 foundry	11.90 to 12.40
Southern No. 4 foundry	11.40 to 11.90
Southern gray forge	10.90 to 11.40
Ohio silvery, 8 per cent. silicon	16.01 to 16.26
Southern Ohio coke, No. 1	14.76 to 15.26
Southern Ohio coke, No. 2	13.76 to 14.26
Southern Ohio coke, No. 3	13.51 to 13.76
Southern Ohio malleable Bessemer	13.76 to 14.01
Basic, Northern	13.76 to 14.01
Lake Superior charcoal	16.29 to 17.20
Standard Southern carwheel	26.90 to 27.40

(By Mail)

Coke.—Contracting for a future supply of foundry coke has been fairly heavy the past few days. In some cases, it is stated that the usual tonnage was not bought, but the foundries are generally of the opinion that present quotations are as low as can be expected and are not taking chances on having to pay higher prices later. We quote Connellsville furnace coke around \$1.50 to \$1.60 per net ton at oven, and foundry coke at \$2.15 to \$2.50, the lower price representing prompt shipment only. The average for contract coke is around \$2.35 to \$2.40. Wise County operators are quoting \$2.25 to \$2.50 per net ton at oven, and some contracting has been done at both prices named.

Finished Material.—Galvanized sheets continue to advance and quotations made by nearby mills range from 5.50c. to 6c. for No. 28, Pittsburgh basis, and only for prompt shipment. One maker has withdrawn from the market temporarily. A few jobbing companies are quoting 6c., f.o.b. Cincinnati, for small lots, and lower than this can be done on carload lots. Black sheets are unchanged at 1.80c., Pittsburgh, and considerable business is reported. Steel bars are quoted by mill agencies at 1.20c., Pittsburgh, and 1.25c. for future shipment. Local warehouse prices on steel bars range from 1.75c. to 1.80c., and $\frac{3}{4}$ -in. twisted bars 1.95c. Railroad track material is not in very good demand. There is some improvement in the call for both steel and wrought-iron pipe. The M. D. Larkin Supply Company, Dayton, Ohio, has put out inquiries for prices on 6000 tons of $3\frac{1}{4}$ -in. round steel bars to be used for making shrapnel. The company advises that these bars are not for use by any Dayton manufacturer. Sales agents have received wire advances on high speed tool steel ranging from 10c. to 15c. per lb.

Old Material.—A slightly better demand is reported from the rolling mills, but not enough to affect the market. The foundries are consuming about the usual quantity as for the past few months, but are not contracting ahead. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton		
Bundled sheet scrap	\$6.25 to	\$6.75
Old iron rails	10.50 to	11.50
Relaying rails, 50 lb. and up	19.25 to	19.75
Rerolling steel rails	9.75 to	10.25
Melting steel rails	8.50 to	9.00
Heavy melting steel scrap	8.50 to	9.00

Per Net Ton		
No. 1 railroad wrought	\$8.50 to	\$9.00
Cast borings	4.50 to	5.00
Steel turnings	4.50 to	5.00
Railroad cast scrap	9.00 to	9.50
No. 1 machinery cast scrap	10.25 to	10.75
Burnt scrap	6.50 to	7.00
Old iron axles	13.50 to	14.00
Locomotive tires (smooth inside)	8.50 to	9.00
Pipes and flues	5.75 to	6.25
Malleable and steel scrap	7.00 to	7.50
Railroad tank and sheet scrap	5.00 to	5.50

Buffalo

BUFFALO, N. Y., June 15, 1915.

Pig Iron.—Sales have been comparatively light, although comprising a few for 400 to 500 tons each. Inquiry appears to be growing, however. One inquiry is reported for nearly 3000 tons of malleable from the eastern part of the State. Contract shipments have been increasingly heavy. A rumor that quite heavy sales were made in a quiet way in May by one selling interest at concession prices does not appear to be true. Producers as a rule appear not to be aggressively seeking forward delivery business. Prices show signs of strengthening, but we continue to quote as follows, f.o.b. furnace, Buffalo, for last half delivery:

No. 1 foundry	\$13.00 to	\$13.25
No. 2 X foundry	12.75 to	13.25
No. 2 plain	12.75 to	13.00
No. 3 foundry	12.50 to	12.75
Gray forge		12.50
Malleable	12.75 to	13.25
Basic	13.25 to	13.75
Charcoal, regular grades and analysis	15.75 to	17.25
Charcoal, special grades and analysis	19.00 to	20.00

Finished Iron and Steel.—Mills are falling behind on deliveries, especially on bar material and steel pipe. On contracts expiring June 30 specifications are heavy. The leading interest has announced that effective immediately the third quarter price of 1.25c., Pittsburgh, will apply to business placed in the remainder of June, and it is understood that practically all of the other producers have withdrawn their 1.20c. price for the remainder of the second quarter. Activity is noted in wire products, particularly for rods, export demand being heavy. It is reported there was one inquiry in the market from Canada for 2000 tons of rods for July, August and September delivery which the buyer was unable to close in this country. Bids were taken today on 400 tons of reinforcing bars for the Buffalo Cold Storage Company. Structural steel fabricators

report a higher trend in prices. Bids are in on about 300 tons of steel for the Struthers Wells plant, at Warren, Pa. Lupfer & Remick, contracting engineers, Buffalo, have the contract for the 430-ft. span double-leaf bascule highway bridge over the Mullica River in New Jersey, requiring about 600 tons. Contract for 300 tons for the Union Carbide Company, Sault Ste. Marie, was awarded to the Morava Construction Company, Chicago.

Old Material.—Activity in heavy melting steel continues and a number of fairly good sales in railroad malleable and cast scrap were also made. The price for malleable scrap has advanced \$1 per gross ton and for railroad and machinery cast scrap 50c. per ton. There are no considerable quantities obtainable of either malleable or cast scrap in this market. The week has shown a slight reaction in the price of machine shop turnings, although not sufficient to affect the list. We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$10.75 to	\$11.00
Low phosphorus steel	13.00 to	13.50
No. 1 railroad wrought scrap	10.50 to	11.00
No. 1 railroad and machinery cast	11.00 to	11.50
Old steel axles	12.00 to	12.50
Old iron axles	16.00 to	16.50
Old carwheels	11.50 to	12.00
Railroad malleable	10.50 to	11.00
Machine shop turnings	5.75 to	6.25
Heavy axle turnings	8.50 to	9.00
Clean cast borings	6.75 to	7.00
Old iron rails	11.00 to	11.50
Locomotive grate bars	9.00 to	9.50
Stove plate (net ton)	8.25 to	8.75
Wrought pipe	7.00 to	7.50
Bundled sheet scrap	7.25 to	7.75
No. 1 busheling scrap	8.50 to	9.00
No. 2 busheling scrap	6.50 to	7.00
Bundled tin scrap		9.00

Cleveland

CLEVELAND, OHIO, June 15, 1915.

Iron Ore.—A few small lot sales are reported and sellers see indications of a more active demand in the near future than has existed since the opening of the market a few weeks ago. So far, outside of sales to affiliated interests, the orders placed have been for the most part for small lots of ore for early requirements. On June 1 there was 5,970,115 gross tons of ore on Lake Erie docks as compared with 5,772,462 tons on June 1, 1914. Out of a total of 5,012,359 tons shipped in May from upper Lake ports, Lake Erie ports received 3,533,524 tons. We quote base prices as follows, delivered to lower lake ports, the Mesaba ore quotations being reduced 5c. a ton because of the recent reduction in rail freight rates from the Mesaba range: Old range Bessemer, \$3.75; Mesaba Bessemer, \$3.45; old range non-Bessemer, \$3; Mesaba non-Bessemer, \$2.80.

Pig Iron.—There is very little new inquiry for any grade of pig iron. Some small lots of foundry iron are being sold for the last half, but there are practically no spot shipment orders. One interest reports sales for the week aggregating about 4000 tons. Most consumers are under contract for their last half requirements. Southern iron is not firm. Tennessee foundry iron is being freely offered at \$9.50, Birmingham, for No. 2 for prompt shipment and the third quarter, and sales of Alabama iron are reported at that price for both early shipment and future delivery, although several producers are asking \$9.75, and one maker reports a local sale of 300 tons for the last half at \$10. The melt continues good. Local jobbing foundries are very busy, but in some localities foundries are not being operated at full capacity. We quote, delivered Cleveland, as follows:

Bessemer	.....	\$14.65
Basic	.....	13.55
Northern No. 2 foundry	.....	\$13.00 to 13.50
Southern No. 2 foundry	.....	13.50 to 14.00
Gray forge	.....	12.75
Jackson Co. silvery 8 per cent. silicon	.....	16.37 to 16.62
Standard low phos. at furnace	.....	19.75 to 20.00

Coke.—A fair volume of additional business in foundry coke has been placed and consumers are now mostly under contract for their requirements for twelve months. There is no inquiry for furnace grades. We quote standard Connellsville foundry coke at \$2.25 to \$2.50 per net ton at oven for prompt shipment and contracts. Furnace coke is held at \$1.50 for spot shipment and \$1.65 to \$1.75 for the last half.

Finished Iron and Steel.—Business in finished lines continues very satisfactory. Specifications are coming out in good volume and there has been considerable additional contracting, most consumers now being covered for the third quarter. The demand from the automobile trade is heavy. The market is firm and several mills have advanced their price on steel bars, plates and structural material to 1.25c. for June delivery. Mills are well filled with steel bar specifications and some cannot make shipments within three weeks. A Cleveland consumer has contracted with a local and another Ohio mill for 4000 tons of rerolling billets for the last half. There is considerable demand from the automobile makers for forging steel bars for prompt shipment. Iron bars continue dull with prices unchanged at 1.15c., Pittsburgh. The American Bridge Company has taken 1200 tons for a building for the B. F. Goodrich Company, Akron, Ohio, and the Massillon Bridge & Structural Company 390 tons for a market house in Cleveland. Some round lot structural specifications are coming from Ohio fabricators. The galvanized sheet situation is growing worse and several Ohio mills are placing long terme sheets and other substitutes on the market. Mills are asking 5c. to 5.50c. for No. 28 galvanized sheets, but some sales are being made as low as 4.25c. by jobbers who have low price contracts that expire July 1. Warehouse quotations on galvanized sheets range from 4.85c. to 5c. The demand for black sheets has improved, but prices are somewhat irregular, ranging from 1.70c. to 1.80c., Ohio mill, for No. 28. Some third-quarter contracts are being placed at 1.85c. No. 10 blue annealed sheets are quoted at 1.30c. to 1.35c. for prompt shipment and 1.40c. for the fourth quarter. We quote warehouse prices at 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—Rivet makers have established prices for third quarter contracts at 1.50c., Pittsburgh, for structural and 1.60c. for boiler rivets. Considerable tonnage has been booked largely from the ship builders and tank builders, for that delivery. Makers are asking \$2 a ton above the quoted prices for the last quarter but are not pressing sales for that delivery. Bolts and nuts are in fair demand, some improvement being noted in specifications for small bolts. Bolt and nut discounts are as follows: Common carriage bolts $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 80 and 10 per cent.; cut thread, 80 and 5 per cent.; larger or longer, 75 and 15 per cent.; machine bolts with h. p. nuts, $\frac{3}{4}$ x 4 in., smaller or shorter, rolled thread, 80 and 15 per cent.; cut thread, 80 and 10 per cent.; larger or longer, 80 per cent.; coach and lag screws, 85 per cent.; square h. p. nuts, blank or tapped, \$6.40 off; hexagon h. p. nuts, blank or tapped, \$7.30 off; c.p.c. and t. square nuts, blank or tapped, \$6.10 off; hexagon $\frac{3}{4}$ in. and larger, \$7.60 off; $\frac{9}{16}$ and smaller, \$8.30 off; semi-finished hexagon nuts, $\frac{3}{4}$ in. and larger, 85, 10, 10 and 5 per cent.; $\frac{9}{16}$ and smaller, 85, 10, 10, 10 and 5 per cent.

Old Material.—The market is inactive both in Cleveland and the valley district. Dealers are looking for a quiet spell during the next few weeks. As regards prices, the market is not displaying any particular strength or weakness. However, one local mill that has been paying \$11 for heavy melting steel, is at present offering only \$10.75. This grade is quoted at \$11.75 for Youngstown delivery. There is considerable surplus on the market and mills are not taking shipments as rapidly as desired. We quote f.o.b. Cleveland as follows:

Per Gross Ton	
Old steel rails, rerolling.....	\$11.00 to \$11.75
Old iron rails	12.00
Steel car axles	12.00 to 12.50
Heavy melting steel	10.50 to 11.00
Old carwheels	9.75 to 10.00
Relaying rails, 50 lb. and over.....	22.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	10.00 to 10.25
Steel axle turnings	8.75 to 9.00
Light bundled sheet scrap	8.00 to 8.50

Per Net Ton	
Iron car axles	\$14.50 to \$15.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings.....	5.50 to 5.75
No. 1 busheling	8.50 to 8.75
No. 1 railroad wrought	9.25 to 9.50
No. 1 cast	9.75 to 10.25
Stove plate	7.75 to 8.00

St. Louis

ST. LOUIS, MO., June 14, 1915.

Pig Iron.—Demand is at the minimum and there is some tendency toward a softening of prices, particularly in No. 2 Southern foundry. This is now generally available at \$9.75 per ton and could probably be obtained for \$9.50, in a large quantity. Probably none of the sales of the week exceeded 100 tons.

Coke.—Foundrymen continue to renew contracts on the basis of last year's tonnage but at concession prices with an increase in quantity in some few instances. No new business is appearing. By-product coke is quotable at \$5.20 delivered St. Louis.

Finished Iron and Steel.—Bids for the municipal bridge at St. Louis, 24,000 tons, will be opened June 29. The St. Louis & San Francisco receivers have obtained authority from the Federal court to purchase rails to an amount estimated as high as 40,000 tons. It is doubted that this will come into the market before the end of the present fiscal year, July 1. Stock out of warehouse continues to move freely. We quote as follows for such material: Soft steel bars, 1.70c.; iron bars, 1.65c.; structural material, 1.80c.; tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, one pass, 2.55c.; No. 28 galvanized sheets, black sheet gauge, 4.85c. to large customers, but selling as high as 5.25c. on small lots.

Old Material.—Scrap dealers are doing practically nothing, though there are expectations of improvement within the next 60 days. Mills are taking nothing and even deferring deliveries on contracted material. Relaying rails are quite active with increasing inquiry and firm prices. There is also some increase of inquiry reported on other forms of scrap. Lists coming out from the railroads are heavy, indicating a desire to clean up before the end of the fiscal year and this means depression of prices. Lists reported this week include the Chicago, Peoria & St. Louis, 1000 tons; Terminal Association of St. Louis, 700 tons; Missouri, Kansas & Texas, 2000 tons; Union Pacific, St. Louis delivery, 3000 tons, and Big Four, 4000 tons. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton	
Old iron rails	\$10.00 to \$10.50
Old steel rails, rerolling	9.50 to 10.00
Old steel rails, less than 3 ft.	10.25 to 10.75
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	8.75 to 9.25
No. 1 railroad heavy melting steel scrap	8.75 to 9.25
Shoveling steel	7.75 to 8.00
Frogs, switches and guards cut apart	8.75 to 9.25
Bundled sheet scrap	5.50 to 6.00

Per Net Ton	
Iron angle bars	\$10.00 to \$10.50
Steel angle bars	7.75 to 8.25
Iron car axles	13.50 to 14.00
Steel car axles	9.50 to 10.00
Wrought arch bars and transoms.....	10.75 to 11.25
No. 1 railroad wrought	7.50 to 8.00
No. 2 railroad wrought	7.50 to 8.00
Railroad springs	7.75 to 8.25
Steel couplers and knuckles	7.75 to 8.25
Locomotive tires 42 in. and over smooth inside	8.50 to 9.00
No. 1 dealers' forge	6.75 to 7.25
Mixed borings	4.50 to 5.00
No. 1 busheling	7.00 to 7.25
No. 1 boilers, cut to sheets and rings	5.75 to 6.25
No. 1 railroad cast scrap.....	7.75 to 8.25
Stove plate and light cast scrap.....	6.25 to 6.75
Railroad malleable	5.75 to 6.25
Agricultural malleable	5.25 to 5.75
Pipes and flues	5.75 to 6.25
Railroad sheet and tank scrap.....	5.75 to 6.25
Railroad grate bars	6.25 to 6.50
Machine shop turnings	4.75 to 5.25

Birmingham

BIRMINGHAM, ALA., June 14, 1915.

Pig Iron.—The market is listless. A dearth of inquiry prevails. Current sales are probably even less in volume than in May, itself an uneventful month. One producer has sold 5000 tons this month, and disposed of its make in May. No other one makes as good a report. Among the week's transactions were a sale of 100 tons and one of 500 tons by two separate makers, each on the \$10 basis. The leading interest and one other are flat-footed on the \$10 basis, but report nothing more than scattering sales. One large maker

openly quotes \$9.75 for spot delivery and there is no reason to doubt that large tonnages for forward delivery could be secured on that basis. Investigations of a few sales made below the \$9.75 basis have resulted, so the investigators declare, in the discovery that the iron was low in silicon, being really below grade. It however remains that one producer has sold below \$9.75. Shipments are heavy. The stock reduction of June will probably equal the 35,000-ton record of May. Clifton special iron, made by the Alabama Company, is reported as taken care of for practically the remainder of the year. One cause of this is the high price of ferromanganese, for which the Clifton iron, which is high in manganese, is used as a partial substitute, commanding \$1 to \$1.50 per ton over the regular run of foundry. Charcoal iron is also reported as stronger, the Alabama stocks and output going somewhat freely around \$21 foundry. The market tone is firm, as a rule, and the present inactivity continues to be regarded as the natural outcome of the enormous bookings made in April. We quote, per gross ton, f.o.b. Birmingham district furnaces, as generally prevailing prices, as follows:

No. 1 foundry and soft.....	\$10.25 to \$10.50
No. 2 foundry and soft.....	9.75 to 10.00
No. 3 foundry.....	9.25 to 9.50
No. 4 foundry.....	9.00 to 9.25
Gray forge.....	8.75 to 9.00
Basic.....	9.75 to 10.00
Charcoal.....	21.00 to 21.25

Coal and Coke.—Coke has been re-established at prices generally prevailing for the past few months. The output remains about the same with the exception of the increase in that of the Sloss-Sheffield Company, which, however, consumes its own make. We quote, per net ton, f.o.b. oven, for beehive, as follows: Furnace, \$2.50 to \$2.75; foundry, \$3 to \$3.25; by-product, \$2.25 to \$2.50, with some makes higher. The coal trade has felt the stimulus of recent contracts. The Atlantic Coast Line let contracts involving 260,000 tons during the week to the Pratt Consolidated and others. The Alabama Company secured 200,000 tons for the Seaboard's Florida division, an order which up to two years ago went to Tennessee mines.

Cast-Iron Pipe.—No orders of special size have been received by Birmingham district makers, but sufficient business of a filling-in nature has developed to enable maintenance of the same satisfactory output. Prices are firm. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$20; 6-in. and upward, \$18, with \$1 added for gas pipe.

Old Material.—Dealers report continued dullness in cast scrap. The stagnation in the pig-iron trade is felt sympathetically. Steel scrap is in fair demand. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles.....	\$13.00 to \$13.50
Old steel axles.....	12.50 to 13.00
Old iron rails.....	12.50 to 13.00
No. 1 railroad wrought.....	8.50 to 9.00
No. 2 railroad wrought.....	7.50 to 8.00
No. 1 country wrought.....	8.00 to 8.50
No. 1 machinery cast.....	8.25 to 8.50
No. 1 steel scrap.....	8.00 to 8.25
Tram carwheels.....	8.25 to 8.50
Stove plate.....	7.00 to 7.50

New York

NEW YORK, June 16, 1915.

Pig Iron.—Not since the sinking of the Lusitania has the foundry pig-iron trade shown as much willingness on the part of buyers to increase their pig-iron purchases. It appears that in a number of cases the amount of \$12 Buffalo pig-iron taken in the March movement was considerably below the needs of the buyers for second half. Now the furnace companies are asked by some of these buyers to take on additions to the first contracts at the original price. This under the present outlook the furnaces are naturally not willing to do. In this district 8000 to 9000 tons of inquiry came up in the past week, some of it from New York State foundries and more from foundries in New England and New Jersey. One inquiry is for 2000 to 3000 tons. Several for 1000 tons have appeared. On Buffalo iron \$12.50 at furnace has recently been done for No. 2 X, but some makers have asked more. Where

eastern Pennsylvania and Buffalo irons come in close competition, the former are held rather more firmly than was the case a few weeks ago. Stocks of eastern Pennsylvania iron at furnaces decreased slightly in May and unfilled orders increased considerably. We quote at tidewater as follows: No. 1 foundry, \$14.50 to \$14.75; No. 2 X, \$14.25 to \$14.50; No. 2 plain, \$13.75 to \$14; Southern iron, \$14.50 to \$14.75 for No. 1 and \$14.25 for No. 2.

Ferroalloys.—Ferromanganese is being shipped in moderate quantities from England under license of the British Government and considerable is reported afloat. The situation has changed very little in the past week. Importers here continue to receive inquiries and some sales have been made at \$100, seaboard, but most that is available is delivered on old contracts to regular consumers who seem pretty well covered for the present. An eastern Pennsylvania steelmaker is still making ferromanganese from Brazilian manganese ore, the present price of which is reported to be about 35c. per unit at seaboard. The same ore is stated to be 40c. delivered at British ports. Some Cuban manganese ore is also expected to come to this country. It is suggested that various steelmakers are conserving their stocks of ferromanganese in every way possible, and it is considered probable that some of the steel being produced is lower in manganese and higher in carbon in cases where such a balancing of the elements will produce the desired static qualities and meet chemical specifications. The 50-per cent. ferrosilicon market is in a very healthy condition, with the demand strong and sales frequent at \$71 to \$73, Pittsburgh.

Structural Material.—In the buying for manufacturing plants, fabricators find their chief encouragement, the railroads still offering little in bridge work and general building demands locally being low. The situation is evidence of the stimulation given in a widening degree to general manufacture as the result of war orders. As it is, the reports of the Bridge Builders and Structural Society show that 62½ per cent. of the capacity of the country's shops was put under contract on the average in the last three months, while for the same period in 1914 the figure was nearly 74 per cent., showing a diminution in work of 15 per cent. this year. One other point to be noted is that users are hastening to cover on specific jobs against a price increase next month. The largest work let in the week is that for the Winchester Repeating Arms Company at New Haven, 700 tons to the American Bridge Company and 850 tons divided, it is believed, between the Belmont Iron Works and the Phoenix Iron Company. The Levering & Garrigues Company has taken 1170 tons, 870 tons for a power station at Albany, N. Y., and the remainder for a factory for the Union Mfg. Company, New Britain, Conn. Other awards include 750 tons for the Burton building to the Hay Foundry & Iron Works; 400 tons for the Truesdale apartment, Washington, D. C., to the Chesapeake Iron Works Company, and 200 tons for a powerhouse for the Diamond Match Company, Oswego, N. Y., to the Lackawanna Bridge Company. The Pennsylvania Railroad is in the market for 600 tons of bridge material. Otherwise little new work of size has come out but jobbers report an improvement. We quote mill shipments at 1.20c., Pittsburgh, or 1.369c., New York, and from store, 1.85c. to 1.90c., New York.

Steel Plates.—Besides the 7000 cars, partly steel underframe box and partly steel gondola cars, to be built for Russia by the Pressed Steel Car Company, the American Car & Foundry Company, the Eastern Car Company and the Canadian Car & Foundry Company are each to build 2000 cars. When it is realized that the American type of car, as to length, capacity and equipment, is to be furnished, certainly so far as the Pressed Steel Car order is concerned, some idea of the obstacles which had to be met in closing the transaction may be gained. Deliveries are to be made as rapidly as possible and besides involving altogether about 175,000 tons of steel, the orders combined mean a shipment, doubtless by way of Vladivostok, of at least 13,000 carloads. The difficulties are enhanced by the necessity of partial erection here for complete

assembly at point of delivery. The importance of the Russian buying is also indicated in the placing of 450 locomotives in this country, including 250 to the Baldwin Locomotive Works and 100 to the American Locomotive Company. Other car business is looking up moderately. A decision is expected next week on the Havana Central exceeding 1500 cars; the Chicago & Northwestern is considering 500 automobile cars; the St. Paul may buy 2000 box cars and it appears that arrangements have been made for the Rock Island to buy 4000 cars. Active inquiry for passenger equipment includes 18 cars for the Western Maryland, 12 to 15 for the Delaware & Hudson, and 4 dining cars for Seaboard Air line. The Cambria Steel Company is to build 400 ore cars for the Lake Superior & Ishpeming and the Pressed Steel Car Company 40 cars for the Chile Exploration Company. Demand for plates for structural work has not improved, but the Eastern mills are active in ship plates. Second half contracts are under consideration and the Worth Brothers Company, through J. J. F. Mulcahy, New York sales manager, has closed with the Standard Oil Company for 10,000 tons for the last half. Prices in general are showing strength at 1.20c., Pittsburgh, for the third quarter and 1.25c. for fourth quarter. We quote steel plates at 1.15c. to 1.20c., Pittsburgh, or 1.319c. to 1.369c., New York, and from store, 1.85c. to 1.90c., New York.

Iron and Steel Bars.—Specifications are coming in at a greater rate than mill operations and indications point strongly to an increase of \$1 a ton by July 1, with increasing desires on the part of buyers to cover under contracts at the present quotations. There is no cessation of foreign inquiry, though this is largely for semi-finished steel, and the base for export quotations is the same as for domestic consumption. Bar iron mills are also noting increased interest on the part of consumers for contracts and one mill expects to hold bar iron at 1.25c. at mill, making it about 1.35c., New York. We quote mill shipments of steel bars at 1.20c., Pittsburgh, or 1.369c., New York, and refined iron bars, 1.20c. to 1.25c., New York. Out of store in New York iron and steel bars are 1.80c. to 1.85c.

Cast-Iron Pipe.—Municipal lettings are still few in number. South Easton, Mass., opened bids last Saturday on 1100 tons of 4's, 6's and 8's, but the successful bidder is not so far known. Private buying continues excellent, but quantities are seldom large. An inquiry for about 1800 tons of 20's is in the market from an affiliated interest of the Lehigh Valley Railroad Company. Small quantities of pipe are being sold for export, and an inquiry is in hand for 1000 tons to go to San Domingo. Prices are slightly higher. Carload lots of 6-in., class B and heavier, are quoted at \$22.50 to \$23 per net ton, tidewater; class A and gas pipe taking an extra of \$1 per ton.

Old Material.—Conditions are practically unchanged. The large railroad lists appear to have been absorbed either by brokers or consumers without causing any noteworthy reduction in prices. The strength of the market is indicated by the manner in which the supply of scrap so steadily coming out disappears without making prices recede to a lower level. Brokers' quotations to local dealers and producers, per gross ton, New York, are as follows:

Old girder and T rails for melting	\$8.75 to \$9.00
Heavy melting steel scrap	8.75 to 9.00
Relaying rails	19.00 to 19.50
Rolling rails (nominal)	8.75 to 9.00
Iron car axles (nominal)	15.25 to 15.75
Steel car axles (nominal)	11.75 to 12.25
No. 1 railroad wrought	10.50 to 10.75
Wrought-iron track scrap	9.50 to 9.75
No. 1 yard wrought, long	9.50 to 9.75
No. 1 yard wrought, short	9.00 to 9.25
Light iron	3.25 to 3.75
Cast borings	5.50 to 5.75
Wrought turnings	6.00 to 6.25
Wrought pipe	8.00 to 8.25

Nothing of importance has developed with regard to the foundry trade. The great majority of foundries continue to purchase most conservatively. Quotations to consumers on cast scrap are as follows, per gross ton, New York:

Old carwheels	\$9.25 to \$9.50
No. 1 heavy cast, broken up	11.00 to 11.50
Stove plate	8.00 to 8.25
Locomotive grate bars	7.50 to 8.00
Malleable cast (railroad)	7.50 to 8.00

British Market Firmer

Pig Iron Higher—Sales of American Bars, Billets and Tin Plates

(By Cable)

LONDON, ENGLAND, June 16, 1915.

The pig-iron market is firmer, with better inquiries for the home trade. Export permits are being granted more readily and new business is reported for Italy. Stocks are slightly smaller assisting sentiment, those in Connal's stores being 152,780 tons at the close of last week against 153,717 tons one week previous. Hematite pig iron remains dull and easy with the market over-supplied with ore. The furnaces in blast are 166 against 167 a year ago.

The German pig-iron syndicate is reported to have raised prices of foundry iron for the third quarter 7½m. (\$1.78) and hematite iron 15m. (\$3.57). Finished steel is strong and marked bars have been raised 20s. (\$4.87) to £12 (\$58.39) which is the highest price in 40 years. Semi-finished material is very firm, and further sales of American sheet bars and billets have been made at £6 15s. (\$32.85), c.i.f. Liverpool. Prices of finished material continue to advance. Small sales of high grade American charcoal tin plates have been made to England and oil size wasters have been offered. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales, 19s. (\$4.62) against 18s. 9d. (\$4.56) last week.
Cleveland pig-iron warrants, 67s. 7d. (\$16.44) against 65s. 10d. (\$16.02) last week.
No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 67s. 9d. (\$16.48) against 66s. 3d. (\$16.12), one week ago.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £11 15s. (\$57.18).
Steel ship plates, Scotch, delivered local yards, £9 15s. (\$47.44).
Steel rails, export, f.o.b. works port, £8 7s. 6d. (\$40.75).
Hematite pig iron, f.o.b. Tees, 100s. (\$24.33) against 102s. 6d. (\$24.94) one week ago.
Sheet bars (Welsh), delivered at works in Swansea Valley, £7 15s. (\$37.71) compared with £7 (\$34.06) a week ago.
Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £10 (\$48.66) against £9 15s. (\$47.44) last week.
Steel bars, export, f.o.b. Clyde, £10 15s. (\$52.31).
Ferromanganese, f.o.b. £20 15s. (\$100.98).
Ferro-silicon, 50 per cent., c.i.f., £14 5s. (\$69.35) compared with £14 (\$68.13) last week.

Export Situation in Pig Iron Relieved—Ferromanganese Position Perplexing

(By Mail)

LONDON, ENGLAND, June 1, 1915.

The Cleveland pig-iron market has been irregular, with considerable anxiety felt regarding the export situation. The stocks in the public warehouses are increasing slowly, but makers state that there is no accumulation in their private yards. It is felt that the declaration of war by Italy must have a favorable influence upon the Cleveland iron trade, because it will permit the full resumption of shipments from the Tees, for Italy was of course included in the embargo on Cleveland iron. Now that local committees have been formed to deal with licenses, the shipping trade is likely to go forward more smoothly and a good number of sales have been arranged. The need of applying to London will be obviated and the granting of licenses will be materially expedited. Relief as to the cost of production and even higher prices is not looked for and deliveries of iron are being delayed owing to coke shortage. It is certain that unless pig-iron prices advance or coke prices fall, output must be further restricted.

The iron-ore market is quiet and works are pretty well supplied with furnace material. Some seized cargoes have been dealt with which have helped to fill up Eastcoast markets, and consumers now have no need to come into the market.

The ferromanganese position is rather perplexing. The association recently issued circulars saying that makers proposed to invoice half outstanding balances at the new figure of £20 (\$97.33) loose and half at the old price of £17 (\$82.73), but this did not suit consumers. The makers later modified their original ideas and intimated that they would deliver half the unexecuted balances at the old price and half at the new, and

would ship a corresponding quantity at the old price when the war was over. Certain of the steelmakers, however, objected to this and the matter is not yet settled finally.

The tendency of finished prices is upward and some further advances have been published. At a meeting of the English and Scottish steelmakers' associations it was decided to advance the official minimum export price of plates by 10s (\$2.43) a ton. The old minimum had already become largely inoperative. Tin plates are strong because of the high cost of steel and of demands for higher wages and the awkward position in the coal trade. Galvanized sheets are firm with business at a minimum, the trade being killed by the high cost of spelter and steel.

Metal Market

NEW YORK, June 16, 1915.

The Week's Prices

Cents Per Pound for Early Delivery									
Copper, New York		Electro-lytic New York		Tin, New York		Lead, New York		Spelter, New York	
June	Lake	Electro-lytic	New York	York	Louis	York	Louis	York	Louis
9.....	22.50	19.75	40.25	6.00	6.50	26.50	26.00		
10.....	22.50	19.87½	40.00	6.25	6.75	25.00	24.50		
11.....	22.50	19.87½	40.75	6.50	7.00	23.50	23.00		
12.....	22.50	20.12½	....	7.00	7.75	23.00	22.50		
14.....	22.50	20.37½	42.40	7.00	7.25	22.50	22.00		
15.....	22.50	20.37½	42.25	7.00	7.00	22.00	21.50		

Copper is higher but quiet. Tin has advanced under the influence of a scarcity of spot metal. Lead apparently reached the climax of its upward movement last week, and there are now numerous offerings which tend to ease prices. Resale lots of spelter have caused quotations to decline, but buying is very quiet. Antimony is quiet but firm.

New York

Copper.—Late last week there was some buying of electrolytic which, with inquiries which aggregated several million pounds, caused the market to advance almost daily, but since then there has been but little activity and a slightly easier tone is perceptible. The buying was almost entirely to fill war requirements. A considerable amount of inquiry from this direction is still pending, although not all of it is of a tangible character. The foreign market is strong. While the quotation for electrolytic is 20.50c., full terms, or 20.37½c. cash, New York, it is probable that 20.25c. might be done with second-hands. Lake copper ranges from 20.50c. for the less favored brands up to 24c. for very choice grades, but the latter are out of the market. The exports this month total 9822 tons. Revised figures of the exports in May show that 28,889 tons were exported in that month, making a total for this year of 119,551 tons against 184,312 tons in the same period of 1914.

Tin.—A rather good business was done last week, but since then the market has been quiet. The activity was almost entirely in early shipments from London and the Straits. Spot stocks are rapidly diminishing with no prospect of immediate replenishment, and the result has been advances in the quotation for prompt delivery. There are not many sellers and the market is somewhat ragged as the result of the different values which are placed on various positions by the few who are offering. The price yesterday was 42.25c., New York. The arrivals this month total 1505 tons, and there is afloat 5957 tons.

Lead.—The course of the market has been unique and has held concentrated attention. The demand has been enormous and buyers have bought more than they needed, for many resale lots are now coming out. They are offered by consumers and retailers, as well as by dealers, and quotations show evidence of softening. The enormous demand has greatly reduced the surplus supply in this country and a point is now reached where production will be called upon to meet most of the demand. The activity is attributed to a rush of business from Europe and to a fear on the part of American buyers that they might be faced by an inability to get the metal. In the scramble to buy, sales

are made at widely differing prices and at big advances over the quotations of the leading interest. The latter used its own judgment in selling and as a result the outside market went from ¼c. to ¾c. over its prices, making the situation a very attractive one for independent sellers. The New York quotations given in the foregoing table are those of the American Smelting & Refining Company. The St. Louis prices advanced far beyond New York parity. The quotation on June 12 was 7.75c., St. Louis, against 7c., New York. Old observers say they have not seen parallel conditions in 40 years. The exports this month total 4573 tons.

Spelter.—Following the excitement and rush to buy of a few days ago the market has gradually subsided into an unsettled and quiet state. There is declared to be no anxiety on the part of producers to sell. They say that the scarcity of spelter is just as great to-day as it was last week or two weeks ago. The decline in price is due to offerings by consumers, galvanizers being most frequently mentioned in this connection. The recent sky-rocket trend of prices is declared to have been entirely due to buyers bidding the market up upon themselves, and the tide swung the other way when the demand ceased and the resale lots appeared. The quotation yesterday was about 22c., New York, and this price might have been shaded a little. Sales for July delivery are reported at 21c., East St. Louis. On the other hand an English consumer has offered 23c. for September and October delivery, which one well-sold-up producer was willing to accept for not over 50 tons. The base price of sheet zinc was reduced last Monday from 33c. to 30c. It had been advanced to 33c. June 9. The exports this month total 957 tons.

Antimony.—The market is quiet but firm. Chinese and Japanese, prompt delivery, is quoted at 37½c. duty paid, and at 35c. for July and August in bond.

Old Metals.—With the exception of zinc, the market is strong. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	19.00 to 19.50
Copper, heavy and wire.....	18.00 to 18.50
Copper, light and bottoms.....	15.50 to 16.00
Brass, heavy.....	14.00 to 14.50
Brass, light.....	11.50 to 12.00
Heavy machine composition.....	14.50 to 15.00
No. 1 yellow rod brass turnings.....	14.00 to 15.00
No. 1 red brass or composition turnings.....	12.50 to 13.00
Lead, heavy.....	6.50
Lead, tea.....	6.25
Zinc, scrap.....	16.00

Chicago

JUNE 16.—Despite the increasingly high level of prices, the activity in metals is above normal, and even for the ordinary channels of consumption the customary volume of buying is apparently prevailing. We quote: Casting copper, 19.75c.; Lake copper, 20.75c.; tin, carloads, 43.50c.; small lots, 45.50c.; lead, 7.75c.; spelter, nominally, 26c.; sheet zinc, 33c.; Cookson's antimony, 50.50c.; other grades, 40c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 16c.; copper bottoms, 15c.; copper clips, 15.75c.; red brass, 13c.; yellow brass, 12.75c.; lead pipe, 5.25c.; zinc, 10c.; pewter, No. 1, 23c.; tinfoil, 33c.; block tin pipe, 36c.

St. Louis

JUNE 14.—The market continues excited and is generally higher. Lead is quotable to-day at 8.50c.; spelter, 25c.; tin, 46c.; Lake copper, 21c.; electrolytic copper, 20.50c.; antimony, 40c. In the Joplin ore market zinc blende again broke all records, reaching \$135 per ton and the choicest lots selling as high as \$138. The range was down as low as \$110 for second grade ores. Calamine sold at \$55, with choice lots as high as \$82. Lead ore brought \$72 per ton in most instances, with a few lots \$75. Miscellaneous scrap metals are quoted as follows: Light brass, 11c.; heavy yellow brass, 12.50c. to 13c.; heavy red brass and light copper, 13.50c. to 14c.; heavy copper and copper wire, 16.50c. to 17c.; pewter, 25c.; tinfoil, 35c.; lead, 6c.; zinc, 18c.; tea lead, 3.50c.

The total number of foreign-built vessels admitted to American registry to June 5, 1915, was 148 of 519,743 gross tons.

Iron and Industrial Stocks

NEW YORK, June 16, 1915.

The stock market has been favorably influenced by the splendid Government forecast of the wheat crop, the increase in unfilled orders of the United States Steel Corporation and the improved earnings of railroad companies, as well as the moderate tone of the President's last note to Germany. A number of industrial stocks made sharp gains on the prices of the preceding week. The range of prices on iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.. 17½-19½	Nat. En. & St., com. 15 - 17½
Allis-Chal., pref.. 50½-53½	Pressed St'l, com. 45 - 50½
Am. Can., com.. 39¼-47¾	Pressed St'l, pref. 97
Am. Can., pref.. 100 -103¾	Ry. Steel Spring, com. 32 - 33½
Am. Car & Fdy., com. 52½-56½	Republic, com. 28 - 30¾
Am. Car & Fdy., pref. 115 -116	Republic, pref. 86 - 88
Am. Loco., com. 46¼-52½	Rumely Co., com. 4 - 6½
Am. Loco., pref. 95	Rumely Co., pref. 10¼-15¾
Am. Steel Fdries. 32¾-35¾	Sloss, com. 32¼-37½
Bald. Loco., com. 51½-60¼	Pipe, com. 14 - 15½
Bald. Loco., pref. 105 -105½	U. S. Steel, com. 56¾-61½
Beth. Steel, com. 156 -169½	U. S. Steel, pref. 108¾-109¾
Beth. Steel, pref. 115½-120¼	Va. I. C. & Coke. 36 - 46
Colorado Fuel .. 29½-34	West'gh'se Elec. 94¼-101¼
General Electric. 163½-175	Am. Ship, com. 30 - 33
Gt. No. Ore Cert. 33 - 37¾	Chic. Pneu. Tool 57 - 58
Int. Harv. of N. J., com. 103 -104½	Cambria Steel... 47¼-50
Int. Harv. Corp., com. 62½	Lake Sup. Corp. 8 13/16-13¼
Lackawanna Stl. 44¾-50¼	Pa. Steel, pref. 50 - 60
LaBelle Iron, pref. 103	Warwick 9½
	Cruc. Steel, com. 30¼-32¼
	Cruc. Steel, pref. 89½-90

Dividends

The American Iron & Steel Mfg. Company, regular quarterly 1¼ per cent. on the preferred stock, payable July 1. No dividend was declared on the common stock.

The International Harvester Company of New Jersey, regular quarterly, 1¼ per cent. on the common stock, payable July 16.

The Union Twist Drill Company, regular quarterly 1½ per cent. on the preferred stock and 4½ per cent. on the common stock, payable July 1.

The J. I. Case Threshing Machine Company, regular quarterly, 1¾ per cent. on the preferred stock, payable July 1.

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent., payable July 1.

Sparrows Point Shipyard Busy

The Maryland Steel Company, Sparrows Point, Md., has received a contract for the construction of two freight steamers of 7000 tons capacity each for the Munson Steamship Company, New York. The marine department of the steel company is very busy and work in hand will occupy most of the shipbuilding capacity until late in 1916.

The Hagar Portland Cement Company, organized under the laws of Maine by Edward N. Hagar, until recently president of the Universal Portland Cement Company, has effected the following permanent organization: Edward N. Hagar, president; Morris Metcalf, vice-president; S. B. Rador, vice-president and sales manager; Gordon Wilson, secretary, acting treasurer and in charge of cost accounting; Leonard Wesson, assistant to president in operation and construction; J. P. Beck, assistant to president in extension work; C. W. Lyon, engineer of economies; J. H. Barbasette, superintendent of construction. The charter of the company provides for a capital of \$20,000,000, all in common stock. Its principal office is at 208 South La Salle street, Chicago.

The plant of the New Haven Iron & Steel Company, New Haven, Conn., is to be dismantled. The Dreyfuss Company, Philadelphia, has bought the machinery for about \$20,000 and is to remove it within three months. The real estate and buildings are also up for sale.

The Campbell, Wyant & Cannon Foundry Company, Muskegon, Mich., would like to receive literature from firms whose products are of interest to the head of its chemical laboratory.

Buffalo Coke Discrimination Case

WASHINGTON, D. C., June 15, 1915.—The Interstate Commerce Commission has given notice to the parties in interest in the case of the Buffalo Union Furnace Company and Wickwire Steel Company against the Buffalo & Susquehanna and other railroad companies that further hearings in the case must be deferred until next fall. The complaint, which was quite fully set forth in *The Iron Age* of March 11, page 574, alleges that the Rogers-Brown Iron Company, a Buffalo competitor, enjoys discriminating freight rates on coke which resulted in forcing the complainants to discontinue the operation of their furnaces in the latter part of 1914 and up to the date of the filing of the petition.

An extended hearing was recently held in Buffalo, at which a dozen witnesses were examined, among whom were F. B. Baird, president; Harry Yates, first vice-president, and C. A. Collins, second vice-president of the Buffalo Union Furnace Company; T. H. Wickwire, jr., vice-president and treasurer, and Elbert Rodgers, traffic manager, of the Wickwire Steel Company; William A. Rogers, president Rogers-Brown Iron Company, and Edward R. Darlow and H. T. Miller, receivers for the Buffalo & Susquehanna Railroad Company.

Coke in carloads from Connellsville to Buffalo pays a rate of \$1.85 per ton. Substantially all the coke used in the Buffalo district is shipped from the Connellsville region and from places in northwestern Pennsylvania embraced in the Reynoldsville district, which includes the towns of Sykes, Tyler, Punxsutawney and Du Bois, distant from Buffalo from 159 to 188 miles. The complainants contend that they should have similar rates on coke from these towns to Buffalo, especially as similar rates are maintained on coal. According to the testimony, however, the rate from Punxsutawney, distant 180 miles, and from Du Bois, distant 159 miles, is \$1.45 per ton, while Sykes, 188 miles, and Tyler, 168 miles, enjoy a rate of \$1.05 per ton. This apparent discrimination the complainants charge to the fact that the Rogers-Brown Iron Company and the coke-producing companies operating plants at Tyler and Sykes are under the same control and that substantially all the coke produced at Tyler and Sykes is shipped to the Rogers-Brown Iron Company over the Pennsylvania Railroad under the \$1.05 rate.

Permission to intervene in this case was granted to the Rogers-Brown Iron Company. Counsel for this company stated that it is not a shipper of coke, but has a long-time contract, running something like 50 years, with a coke company at Tyler and Sykes and that the coke producer has no other interests than its coke property. Concerning the contention that the \$1.05 rate for coke to the Buffalo district from these points was unfair and a discrimination against other coke producers and consumers, it was asserted that this rate "is as high as coke can move on to this territory." "The coke produced at these points," said counsel, "does not directly compete with the coke from the Connellsville district, in view of the fact that the cost of manufacturing coke in the Reynoldsville district is \$2.25 per ton. The Reynoldsville coke is not in the same class with Connellsville, being very high in sulphur, and our contention is that in the smelting of iron three tons of Connellsville coke is more than the equivalent of four tons of coke from the Reynoldsville district. The selling price of Connellsville coke during the entire time covered by this complaint, plus the freight to Buffalo, makes it a cheaper coke at destination than that produced in the Reynoldsville district. The Rogers-Brown Company has lost money on every ton of coke it has brought to Buffalo. It has nearly \$800,000 invested, which it put into its business when it was much more optimistic than now relative to the value of Reynoldsville coke."

An interesting development of the Buffalo hearing was the announcement by counsel for the complainants that the claims for reparation made in the original petition, aggregating \$325,000, would be waived for the present and that no evidence would be submitted as to the financial measure of damages heretofore suffered. In reply to a question by the examiner presiding at the hearing, counsel stated that if the reparation claims were revived at any time formal notice to all parties

would be given. The chief object of the proceeding, however, counsel declared, was to prove the existence of a condition of affairs calling for a remedy at the hands of the commission that would enable the complainants to carry on their business hereafter on an equal footing with their competitors.

Owing to uncertainties as to when the testimony of certain important witnesses can be obtained, taken in connection with the understanding that the commission will adjourn for its usual summer recess at an early date, further hearings were put over until the fall and will probably be resumed sometime in October.

W. L. C.

Pittsburgh and Nearby Districts

The Allegheny Steel Company, Pittsburgh, works at Brackenridge, Pa., maker of plates, sheets, and specialties, has acquired the right to manufacture a patented pressed steel side frame for use in building steel cars. Heretofore side frames have been made of cast steel. The company expects that the demand for this new product will take a good part of the output of its 100-in. plate mill. To take care of this new undertaking, it is installing a good deal of new machinery and is erecting for the purpose additional steel buildings as follows: One building, 60 x 120 ft.; one, 90 x 126 ft.; and two 30 x 105 ft. each, all adjoining and connecting, making a total floor area of 25,000 sq. ft. In these buildings will also be placed machinery for use in making general stampings and pressed steel products. It is expected that the new department will be ready for operation within 60 days. It will eventually absorb the present stamping department and will be known as the pressed steel and stamping department.

The Reznor Mfg. Company, Mercer, Pa., maker of gas-heating stoves and Reznor pipe hooks, is building a new factory, 60 x 240 ft., four stories, fireproof, to be ready for occupancy about December 1. The present plant will then be abandoned. Entirely new equipment will be installed.

For the first time since 1907 all four furnaces of the National Tube Company at McKeesport, Pa., are now in blast, the fourth stack having been started last week. These furnaces turn out about 2000 tons of pig iron per day.

At the annual meeting of stockholders of the Westinghouse Electric & Mfg. Company, held in East Pittsburgh June 9, directors were elected as follows: Edwin F. Atkins, Charles F. Brooker and E. M. Herr, four years; John R. McCune and Jerome Hamauer, three years. At the same time and place the annual meeting of stockholders of the Westinghouse Machine Company was held and directors elected as follows: J. D. Callery, E. M. Herr, H. T. Herr, William McConway, John R. McCune, Joseph W. Marsh, L. A. Osborne, Guy E. Tripp and H. H. Westinghouse, one year each. Directors of both companies announced their plants well booked.

Furnace J of the Edgar Thomson group of the Carnegie Steel Company was blown in June 12, and this week furnace B will be blown out. No. 2 Isabella at Etna, Pa., has been changed from Bessemer to basic iron. The company is now operating 44 out of 59 blast furnaces.

The blast furnace of the Wheeling Steel & Iron Company at Martins Ferry, Ohio, which has been idle for more than a year, was started on Wednesday, June 16. It has a daily capacity of about 300 tons. This company is adding two hot tin mills to its tin-plate plant at Yorkville, Ohio, making a total of 12. The new mills will be started about July 15.

The American Bridge Company will now build the Metropolis Bridge over the Ohio River at Paducah, Ky., 18,000 tons. The work has been held up, but it is now stated that it will go ahead actively. The material will be fabricated at the company's Ambridge works.

The benzol plant of the Republic Iron & Steel Company, Youngstown, Ohio, was started this week. It is turning out about 2600 gal. of refined benzol and its by-products per day.

The H. K. Porter Company, Pittsburgh, recently shipped two locomotives to Russia and is now working on about a dozen more light ones for the same country. It is also building two standard locomotives for South America.

The Pittsburgh Crucible Steel Company will add two open-hearth steel furnaces to its plant at Midland, Pa., giving a total of ten 80-ton furnaces.

The Pittsburgh Steel Car Company, organized recently, has bought 100 acres at Greenville, Pa., on part of which it will build a plant for the manufacture of steel freight cars, with a capacity of about 7500 cars per year. Later the company expects to build passenger cars. Plans are now being made for the new works, and the company will be in the market for a large amount of machinery. W. C. Scott, 511 Ferguson Building, Pittsburgh, is temporary secretary of the company, to whom inquiries should be sent.

The National Tube Company, has long had under contemplation the doubling of the capacity of its seamless tube plant at Ellwood City, Pa. It now turns out about 4000 tons per month, and it is not improbable that some large additions will be made in the near future. The company recently made a shipment from its National works at McKeesport, Pa., of 10 carloads of 24-in. National Matheson pipe to the George A. Lowe Company, Ogden, Utah. The total shipment weighed 517,800 lb., the freight being 78.9c. per 100 lb., and the total freight charges on the shipment were \$4085.44.

The Bradshaw-Huessener gas burning system for utilizing blast furnace gas at hot stoves and boilers is to be applied to boilers of the Empire Steel & Iron Company; to one stove and to boilers of the Shenango furnace; to two stoves and to boilers of the Boyne City Chemical Company, and to two stoves and to boilers of the East Jordan Chemical Company, besides four stoves of the Pittsburgh Steel Company.

The sheet-bar mills in the open-hearth steel plant at the Farrell works of the Carnegie Steel Company turned out in May 23,318 tons, against 22,261 tons, the best previous record for one month.

Large Mill Additions at Youngstown

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has made a contract with the Morgan Construction Company, Worcester, Mass., for a 9-in. continuous mill, a 12-in. continuous mill and a 14 to 18-in. continuous mill, all to be completed about April 1, 1916. In addition to these mills the company expects to build two hand mills, or jobbing mills, the sizes of which have not yet been decided upon, but they will probably be 10-in. and 16-in. Its layout is for 9, 10, 12 and 14 to 18-in. continuous mills, four in all, and four hand mills, probably 8, 10, 16 and 20-in. It is not likely that these last will all be erected for several years, but they will be added a mill at a time.

The Cave Welding & Mfg. Company, a new Massachusetts corporation, has purchased the business of the Autogenous Welding Equipment Company, at times known as the Welding Company, and the Cave Welding Company, Springfield, Mass. It will continue to represent the Davis-Bournonville Company for the sale of welding and cutting equipment and supplies, and will also represent the Commercial Acetylene Railway Light & Signal Company for the sale of dissolved acetylene. It is the intention of the new company to give special attention to the use of welding in manufacturing. It will also continue to manufacture Weldec products.

The Ashland furnace of the Charcoal Iron Company of America, Ashland, Wis., and one Pioneer stack at Marquette, Mich., will be blown in July 1.

The Sullivan Machinery Company has removed its Boston office from 35 Federal street to room 1010 Unity Building, 185 Devonshire street.

CORPORATION SCHOOL WORK

Annual Convention of the National Association at Worcester, Mass.

The combined occasions of the third annual convention of the National Association of Corporation Schools and the 50th anniversary of the founding of the Worcester Polytechnic Institute at Worcester, Mass., last week produced a most unusual assemblage of men and women interested professionally in the preparation of young people for high grade work in the arts and industries of the country. As the common assembling place was the Bancroft Hotel, there were reciprocal opportunities for contacts with persons quite worth while. The Polytechnic's exercises were of unusual interest, including the laying of the cornerstone of the new gymnasium, an alumni dinner which was full of enthusiasm, the reception to President Ira N. Hollis and the usual graduation exercises. Many distinguished educators were present.

The important features of the convention of the National Association of Corporation Schools were the conferences, including evening round table meetings which were strictly confidential and at which the members could speak with the utmost freedom. Those in the daytime followed reports of committees. The Committee on Allied Institutions reported through James A. Roosevelt, its chairman, and discussion was presented by Dr. Paul H. Hanus, Harvard University; Norman Collyer, Southern Pacific Railroad; Dr. Lee Galloway, New York University, and F. C. Henderschott, New York Edison Company. J. M. Larkin as chairman made the report of the committee on trade apprenticeship schools, the discussion being by F. W. Thomas, Atchison, Topeka & Santa Fe Railroad; W. L. Chandler, Dodge Mfg. Company; A. L. Rohrer, General Electric Company; A. F. Bardwell, Yale & Towne Mfg. Company; F. J. Trinder, Connecticut Trade Schools, and C. J. Hicks, International Harvester Company. For the Committee on Special Apprenticeship, Fred R. Jenkins made the report and the subject was discussed by Harry Tipper, Texas Company; S. W. Ashe, General Electric Company; L. L. Park, American Locomotive Company; W. C. Ash, Philadelphia Trade Schools; W. D. Arter, New York Central Lines, and J. W. Dietz, Western Electric Company. The report of Arthur E. Corbin, chairman of the committee on public education was discussed by Harriet Fox, Strawbridge & Clothier; E. G. Allen, Cass Technical High School; A. L. Rohrer, General Electric Company; H. H. Wheaton, Department of the Interior; Robert O. Small, Massachusetts Board of Education, and E. H. Fish, Norton Company and Norton Grinding Company.

Dr. Henry C. Metcalf presided as chairman of the committee on vocational guidance and the subject was discussed by Albert C. Vinal, American Telephone & Telegraph Company; E. M. Hopkins, Curtis Publishing Company; John McLeod, Carnegie Steel Company; J. E. Banks, American Bridge Company; Lillian Meyncke, the Rike-Kumler Company, and Edward B. Saunders, Simonds Mfg. Company. George B. Everitt, reported as chairman of the committee on office work schools, and those who took part in the subsequent debate were E. C. Wolf, Curtis Publishing Company; J. W. Schulze, Robert H. Ingersoll & Brother; E. J. Mehren, Engineering Record; Harry A. Hopf, Phoenix Mutual Life Insurance Company; R. H. Puffer, Larkin Company; R. G. Griswold, Doherty Operating Company, and Dr. Louis I. Dublin, Metropolitan Life Insurance Company. The report of the committee on advertising, selling and distribution was made by C. A. S. Howlott as chairman, and the discussion was led by Prof. M. P. Copeland, Harvard Business School; Harry Tipper, Texas Company; W. K. Page, Addressograph Company; T. M. Ambler, Brooklyn Union Gas Company, and J. J. Munsell, Dayton Engineering Laboratories Company. C. R. Johnson, chairman of the committee on employment plans, made its report and the discussion was led by William Skiff, National Lamp Works of the General Electric Company; J. J. Munsell, Dayton Engineering Laboratories Company; N. F. Dougherty, Pennsylvania Railroad Company; John H. Weller, Packard Motor

Car Company; F. P. Pitzer, Equitable Life Insurance Society; A. A. Serva, Fort Wayne Electric Works, and C. J. Reilly, Dennison Mfg. Company.

The final conference was that of the committee on safety, hygiene, and co-operation, of which L. H. Burnett is chairman. The discussion was led by S. W. Ashe, General Electric Company; R. G. Williams, Norton Grinding Company; Dr. Irving W. Clark, Norton Company; Dr. A. G. Risteen, Travelers' Insurance Company; J. C. Robinson, New York Edison Company, and R. B. Lindsay, Midvale Steel Company.

President Charles P. Steinmetz, of the General Electric Company, presided at the opening session Tuesday morning when in the course of formal exercises he made his interesting annual report, as did the other executive officers. The following officers were elected for the ensuing year:

President—John McLeod, assistant to the president of the Carnegie Steel Company, Pittsburgh.

Vice-President—H. J. Tiley, general manager Strawbridge & Clothier, Philadelphia.

Second Vice-President—Harry E. Tipper, advertising manager Texas Company.

Executive Committee—J. W. L. Hale, Pennsylvania Railroad Company; Louis L. Park, American Locomotive Company; W. D. Kelley, Consolidated Gas Company, Brooklyn, N. Y.

The social side of the convention was most attractive, the association being guests of Worcester firms, notably the Norton Company and the American Steel & Wire Company. Thursday evening there was a dinner in the ball room of the Bancroft, with Executive Secretary F. C. Henderschott as toastmaster. The speakers were: Dr. Steinmetz, Charles H. Norton, consulting engineer Norton Grinding Company; John McLeod, the new president; Herbert J. Tiley, Strawbridge & Clothier, Philadelphia; Dr. David Snedden, commissioner of education for Massachusetts; Congressman Samuel E. Winslow, ex-mayor James Logan and Harry E. Tipper.

Cambria-Pennsylvania Merger Reports Revived

The report widely published last week that a consolidation of the Cambria Steel Company and the Pennsylvania Steel Company is imminent is erroneous. It has gained currency many times and last week was revived simultaneously in Pittsburgh and New York. At the office of the Cambria Steel Company, Philadelphia, it was said that there is no more basis for the rumor than existed two months or six months ago. W. H. Donner, president of the Cambria Steel Company, who also is chairman of the board of directors of the Pennsylvania Steel Company, has an option on the Pennsylvania Railroad Company's holdings in the Pennsylvania Steel Company. When this fact became known in April, 1914, it gave rise to a rumor that a merger was pending. Last week's report may have been due to a recent visit made by officers of the Pennsylvania Steel Company, including Mr. Donner, to the plants of the Pennsylvania Steel Company at Steelton, Pa., and the Maryland Steel Company at Sparrows Point, Md., which the former company owns.

In connection with what might be gained by a consolidation of the three companies, it is pointed out that the operations of the Pennsylvania Steel Company were not profitable last year, the annual report showing a deficit of \$678,491, although in 1913 a profit of \$629,644 was made. It has a large bonded indebtedness. Under present conditions it is said to be hardly likely that Mr. Donner will exercise his option. It has two years to run.

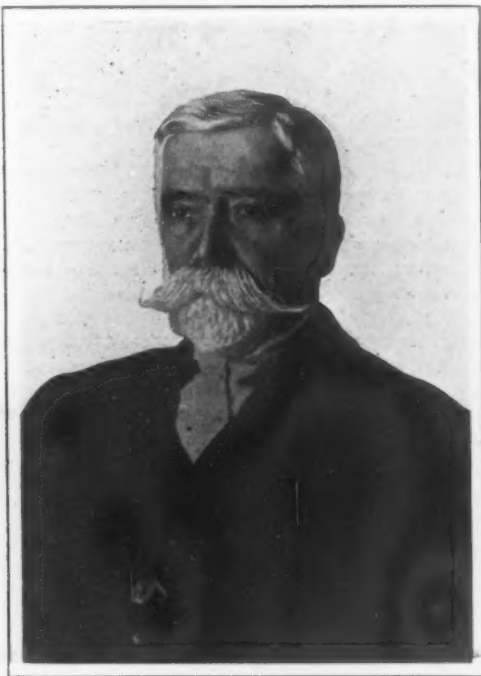
May Orders for Freight Cars Large

It is estimated that the May orders for freight cars were 20,210, including 16,145 for the Pennsylvania Railroad, but taking no account of the reported Russian orders placed with American shops. The average orders for the four months preceding May were a shade under 3000 cars per month. The total for the five months to June 1 of this year is placed at 32,052 cars which compares with 114,000 cars for the first half of 1913 and 66,000 for the first half of 1914.

OBITUARY

Charles L. Gilpin

Charles L. Gilpin, who for many years was one of the most widely known men in the sheet trade, died at a hospital near Philadelphia, June 7, aged 88 years. He was born at Wilmington, Del., and after receiving his education in that city moved to St. Louis in 1845, where he engaged in the iron and steel business. During the Civil War he was connected with the quartermaster's



CHARLES L. GILPIN

department of the union army, and supervised the manufacture of army clothing and equipment. After the war he was for many years associated with Alan Wood & Co., now the Alan Wood Iron & Steel Company, Philadelphia, and subsequently with W. D. Wood & Co., Ltd., Pittsburgh, and their successor, the W. Dewees Wood Company. He was a relative of W. Dewees Wood, who sent Mr. Gilpin to Russia to investigate the manufacture of Russia sheet iron, and to ascertain how to reproduce in this country the beautifully planished surface of the sheets which were then celebrated throughout the world for their rust resisting quality. He was successful in his investigation, his genial personality contributing largely to this result, and the process thus brought to this country established the reputation of the firm whose plant was finally merged with other properties into the American Sheet Steel Company, afterward becoming part of the United States Steel Corporation. Mr. Gilpin became a salesman for W. D. Wood & Co., and afterward successively for the new owners, retiring from business about eight years ago. He was exceptionally well informed on the steel business, especially the sheet branch, and was an authority on tariff legislation. He leaves his widow, one son and two daughters. Richard D. Wood, president Alan Wood Iron & Steel Company, and Thomas D. Wood, a director of that company, are among his nephews.

SAMUEL V. KENNEDY, manager of the Eastern manufacturing operations of the International Harvester Company, died in a hospital at Rochester, Minn., June 2, following an operation. His home was in Auburn, N. Y. He was the inventor of the Kennedy rifle, and had been connected with the Winchester Arms Company, Whitney Arms Company and Colt Mfg. Company, before he entered the business of manufacturing

harvesting machinery with D. M. Osborne & Co., Auburn. After the International Harvester Company acquired the Osborne business, he was given the position he held at the time of his death.

THOMAS JOHNSON, former superintendent of the Harlan & Hollingsworth Company, Wilmington, Del., died at his home at Belle Haven, Va., June 5, aged 87 years. He was born in Wilmington and at the age of 22 entered the employ of the company. From the position of helper in the boiler shop he rose to become superintendent of the shipyard. He retired in 1894 but two years ago he superintended the construction of two steamboats at Sparrows Point, Md. He leaves his widow, a son and three daughters.

VICTOR BOESCH, of the firm of Victor P. Boesch & Son, galvanized iron manufacturers, Cincinnati, died June 3, aged 64 years. He was a native of Alsace-Lorraine, and was taken to Cincinnati by his parents when eight years old. He leaves his widow, a daughter and three sons.

GEORGE S. COMSTOCK, of George S. Comstock & Son, manufacturers of special machinery, Mechanicsburg, Pa., died June 12, aged 64 years. He had been president of the Pennsylvania Society of Engineers. He leaves his widow and four children.

SAMUEL H. MILLIKEN, president Pioneer Iron Works, Brooklyn, N. Y., died at his home in that city May 20, aged 73 years. He was born in New York City but had lived in Brooklyn nearly all his life. He was a veteran of the Civil War.

M. JOSEPH WARD, in charge of the galvanizing department of the Youngstown Sheet & Tube Company, Youngstown, Ohio, died at his home in that city June 11. He was the inventor of a number of appliances used in galvanizing.

GEORGE KENDRICK, president Massachusetts Packing & Belting Company, Boston, was killed June 13 in a steamboat collision on Long Island Sound.

Substituting Lead-Coated Sheets for Galvanized

Ohio sheet manufacturers have been giving the subject of a substitute for galvanized sheets much consideration the past few weeks, because of the high price of spelter, and several have concluded that the best solution of the problem is the manufacture of long terne plates. A number of them that have ceased to make galvanized sheets have already placed orders for complete outfits for coating long ternes and others are placing lead-coated sheets on the market. The Trumbull Steel Company, Warren, Ohio, is bringing out a special coated terne sheet in the same gauges as galvanized. The general adoption of various substitutes for galvanized sheets will mean a large increase in the consumption of lead and will have a tendency to cause a further advance in the price of lead and higher prices for the lead-coated sheets and ternes. While some good business has already been booked in long terne plates as a substitute for galvanized sheets, the trade generally appears to be going slow in this direction and so far most consumers, particularly the small users, prefer paying the high prices for galvanized sheets than to trying the substitute at considerably lower prices.

The Ingersoll-Rand Company, whose main office is at 11 Broadway, New York, opened its branch office in San Francisco, Cal., at 139 Townsend street, June 1, with a view to giving closer attention to present and prospective users of Ingersoll-Rand machinery than it is possible for any agency to do. Harron, Rickard & McCone in that city have been among the company's efficient agents, and arrangements have been made whereby they will co-operate in the sale of its machinery after the expiration of their agency contract July 22 next. H. L. Terwilliger is district manager for the territory handled by the San Francisco and Los Angeles offices, with headquarters in San Francisco.

PERSONAL

A. D. Mixsell, general manager of sales of the Bethlehem Steel Company, South Bethlehem, Pa., has been made a vice-president of the company. He has been succeeded as general sales manager by Edward S. Knisely, who has long been Western representative, with headquarters at Pittsburgh.

A. D. Mixsell, who has been made vice-president of the Bethlehem Steel Company, to engage with President



AUSTIN DAVIS MIXSELL

E. G. Grace in the general affairs of the company, entered the employ of the Bethlehem Steel Company in 1897 in the office of the metallurgical engineer. From then on until 1906 he was in the manufacturing department, working at the open hearth furnaces, the yards, the rolling mills, the forge and machine shops, the laboratories and the inspection bureaus. In his last two years with the manufacturing department he was in charge of the estimating department. In 1906 he was taken into the sales department and in the fall of that year was appointed sales agent in New York. Since the fall of 1908 he has been general sales agent of the company at South Bethlehem, in charge of the sales of the general products. He is a member of the American Iron and Steel Institute and the American Society of Mechanical Engineers.

Fred P. Oliver, who has been connected with the iron and steel trade for about 20 years, for the past five years attached to the New York sales office of the Cambria Steel Company, has resigned his position to become vice-president and general manager of the Blackman Talking Machine Company, 97 Chambers street, New York.

S. W. Hartley, formerly sales manager of the Standard Welding Company, Cleveland, Ohio, has been made manager of production, in charge of all manufacturing orders, raw materials and finished parts. H. A. Flagg, formerly sales manager of the tubing departments, is made general sales manager, in charge of all sales, orders, and branch offices.

Prof. Henry S. Munroe will retire from the professorship of mining in the Columbia School of Mines on June 30, after 38 years of service there. A large number of the alumni of the school tendered him a dinner on May 28.

Wilman H. Benson, superintendent of hull construction, has been made assistant to the general manager of the Newport News Shipbuilding & Dry Dock Company, Newport News, Va. He succeeds F. P. Palen, who has been transferred to the New York office.

W. C. Coffin has been elected president of the University of Pittsburgh General Alumni Association for the coming collegiate year. He was graduated from the department of civil engineering at the Western University of Pennsylvania 32 years ago, of the class of 1883. He is in charge of the structural engineering department of the Jones & Laughlin Steel Company, Pittsburgh.

George Beaumont, of the ore department of Pickands, Mather & Co., Cleveland, Ohio, who has been spending a number of months in southern California, for the benefit of his health, has returned home fully recovered and has resumed his duties.

John C. Haswell, Marion, Ind., widely known in the malleable iron foundry business, has been elected president of the Dayton Malleable Iron Company, Dayton, Ohio, vice Pierce D. Schenck, resigned.

J. B. McKennan, for a number of years manager of the Minnequa plant of the Colorado Fuel & Iron Company, has been appointed general manager of the company.

J. M. McClain, assistant shop superintendent of the Driggs-Seabury Ordnance Corporation, Sharon, Pa., has been appointed shop superintendent. George H. Overholt, formerly assistant general superintendent, has been made production superintendent.

D. F. Domic, until recently general superintendent of the Venango Mfg. Company, Franklin, Pa., has become chief engineer of the Hunter Saw & Machine Company, Pittsburgh.

Large Boiler Contract

The Henry Vogt Machine Company, Louisville, Ky., has been given an order for 10,000 hp. in water-tube boilers by the Standard Oil Company, consisting of twelve 500-hp. boilers for installation at Whiting, Ind., and eight 500-hp. units for Wood River, Ill.; also for two 200-ton refrigerating machines for installation at the Whiting plant, as well as nine chilling machines. The Vogt Company also reports an order for a 100-ton refrigerating machine from the Louisville Provision Company, now remodeling its plant, and for a 110-ton refrigerating machine from the Winter Garden Company, Pittsburgh, operating a permanent exposition building. The boiler contract was the largest the company has ever received.

Idle Cars Increase in May

The net surplus of freight cars on the lines of the United States and Canada on June 1 was 295,295, representing an increase of 3026 idle cars in the month of May. The maximum number of idle cars for this year was 327,084 on April 1. The figure for June 1, 1914, was 242,572.

On May 28 there were 64,432 idle cars on the Pennsylvania Lines as compared with 86,033 on January 4, a decrease of 21,601. This represents an increase in activity of approximately 25 per cent. In February and March, the number of idle cars decreased by 7788, and in April, the decrease was 14,807.

Fabricating Orders 61 Per Cent. in May

At the monthly meeting of the Bridge Builders and Structural Society, held in Phoenixville, Pa., June 11, it was shown from the records collected by the secretary that in the month of May 61 per cent. of the entire capacity of the bridge and structural shops of the country was contracted for.

The National Forge & Tool Company, Erie, Pa., has been incorporated by Frederick J. McCoy, Clinton E. Wilder, Andrew J. and John S. Gillespie, and E. P. Caulfield. The authorized capital stock is \$50,000.

Machinery Markets and News of the Works

FOREIGN DEMAND EASIER

Large Domestic Needs for War Orders

Business Expanding to New Lines — Machine Tool Builders Getting Assistance From Other Manufacturers

In the Central West the feverish demand for machine tools for export is subsiding as fewer foreign inquiries are being received, but there and elsewhere, the pressure from domestic companies to buy tools wherewith they can fulfil war contracts is as great as ever. In fact, the chief question at issue is that of making deliveries. Incidentally the great war business is gradually expanding to other lines and creating fresh need for equipment. In the manufacturing districts the question of skilled workmen continues a vital one, this being particularly so in New England and Cleveland. In the latter city the scarcity has extended to the forge shops. In New England printing press manufacturers, among others, are helping out the machine tool builders. A new Russian inquiry in New York calls for 400 machines, mostly turret lathes. A feature in Detroit is the increasing activity in wood-working machinery, which has been slow for some time; and another is a betterment in construction work. Milwaukee notes an improvement in domestic business. In Cleveland machine tool builders are buying equipment to enable them to meet the abnormal demand upon their shops. Domestic buying in Cincinnati is better, but most of the activity can be traced to manufacturers having war orders. Business continues to improve with the machinery dealers of the Central South. In St. Louis there is but slow improvement and most inquiries are for single tools. Despite inadequate shipping facilities, the outlook is for an increased export trade in the Pacific Northwest.

New York

NEW YORK, June 16, 1915.

A most important feature of the present situation is the rapid manner in which the war demand is spreading out, and to some extent in unexpected directions. An instance is the demand for several thousand boiler tubes fitted with special forgings to be used in the making of powder mill equipment. Again, the sale of high-speed tool steel has been greatly stimulated and large quantities are being taken at high prices. Another feature which stands out is the willingness with which large domestic manufacturers who have war contracts have paid 25 per cent. with their orders, thereby not only giving an undeniable pledge of good faith, but also helping the machine tool manufacturer finance his larger operations.

Buying has been good and has come from all directions in the past week. Telephone calls and telegrams are incessant with the larger dealers, and great as business has been it could be greater were satisfactory deliveries available. One dealer has sold the output of several of his principals up to January 1. In almost every instance quick proposals are wanted. There has been notable activity on the part of internal grinding machines which are wanted by ball-bearing manufacturers. One has taken 22 such machines and another is inquiring for deliveries.

The General Electric Company, Schenectady, N. Y., has continued a heavy buyer of equipment for making shells. Bartlett, Hayward & Company has purchased 90 lathes for shrapnel work. Another purchaser, also for shell work, has been the Hall Switch & Signal Company, Garwood, N. J. Companies in the eastern central part of New York State have bought, or are negotiating for tools, all of which are for war business. The New London Ship & Engine Company, Groton, Conn., contemplates the purchase of a considerable list of equipment.

There is a new Russian inquiry in the market for 400 machines, principally turret lathes. The foreign demand shows no sign of diminishing in New York.

A large amount of machinery equipment is being ordered by the Kerr Turbine Company, Wellsville, N. Y., to provide requisite extra facilities for filling a war munitions contract which it has recently booked.

The E. W. Bliss Company, 11 Adams street, Brooklyn, is reported to plan the construction of a machine shop, at Sag Harbor, for the manufacture of torpedoes.

Samuel L. Moore & Sons, Elizabeth, N. J., a subsidiary of the Bethlehem Steel Company, have been authorized by the city authorities to close three streets traversing the former Crescent shipyards, which it owns. This is the first step toward the construction of a shipyard, which will probably cost about \$1,000,000. The old shipyard will be thoroughly renovated, a new foundry and new piers will be constructed. Several thousand men will be needed for the building operations, and the completed plant will give employment to more than 1000 men.

The Standard Underground Cable Company, Westinghouse Building, Pittsburgh, Pa., is building an addition to its plant at Perth Amboy, N. J., 75 x 175 ft., to cost about \$18,000.

The Magnolia Metal Company, 115 Bank street, New York, has purchased a factory at Matawan, N. J., at a cost of about \$20,000. It will be used principally for smelting. The company has placed contracts for such special equipment.

Sexauer & Lemke, Mill street, Astoria, Long Island, N. Y., structural and architectural iron workers, have purchased the former plant of Rabvitch Brothers at the foot of Pierce avenue, extending from the river to Vernon avenue. It contains two buildings and complete crane equipment, that will enable the new owners to double their capacity.

The John Sommer Faucet Company, Washington, N. J., has moved its Newark, N. J., works from Central avenue to the corner of Central & Morris avenues.

The Poughkeepsie Foundry & Machine Company, Poughkeepsie, N. Y., which has recently increased its capital stock, does not plan any plant extension at the present time.

The American Dressler Tunnel Kilns, 127 Madison avenue, New York City, has been incorporated with a capital stock of \$500,000 by C. J. Kirk, L. and Walter S. Kupfer, 127 Chrystie street, Leonia, N. J., to manufacture ovens to be used in the manufacture of pottery, steel annealing, and the aluminum, electrical insulator and similar industries.

The Inman Mfg. Company, Amsterdam, N. Y., has awarded contract for addition to its box factory, 40 x 75 ft., two stories and basement, of brick and concrete. R. A. Wood is general manager.

The Clover Leaf Milling Company, Buffalo, is adding to its plant at New York Central Railroad and Toisul street a 12-story elevator and mill of steel frame and concrete, which it is estimated will cost about \$250,000. Bids are now being taken.

The city of Syracuse, N. Y., will erect a boilerhouse, 50 x 60 ft., in connection with a new vocational high school at Seneca and Tully streets. Edwin Nottingham is chairman.

The Gurney Ball Bearing Company, Jamestown, N. Y., is having plans prepared for a one-story manufacturing plant which will have 45,000 sq. ft. of floor space. W. T. Falconer is president.

The Wood Products Company, manufacturer of wood alcohol, Pennsylvania and Fourth streets, Buffalo, has taken out a building permit for a two-story brick addition to its plant.

The Fibre Corporation, Lockport, N. Y., has plans in progress for a new manufacturing plant to be erected at an approximate cost of \$100,000, to replace its plant partially destroyed by fire recently. W. R. Seigle is president.

The Common Sense Mfg. Company, Buffalo, is building an addition to its factory at Niagara street, Delavan avenue and the New York Central Railroad Belt Line.

Sealed proposals will be received by the Village Trustees, Oakville, N. Y., until June 24 for pumping machinery, etc., for a waterworks system. S. A. Ingalsbee is clerk.

Plans for a pumphouse to be erected by the Village Board, Hilton, N. Y., are being prepared by H. C. Kittredge, engineer, Rochester.

The American Radiator Company has let contract for the construction of a research building, 60 x 68 ft., two stories and basement, of concrete, to be added to its Pierce plant at Elmwood avenue and New York Central Belt Line Railroad, Buffalo. The cost will be \$30,000.

The Children's Hospital, Buffalo, is taking bids for a power plant and service building to be built at Bryant street and Oakland place at a total estimated cost of \$35,000. Mrs. Bernard Bartow is superintendent.

The Buffalo Cold Storage Company, Buffalo, of which D. E. Knowlton is president, is having plans prepared for a cold storage warehouse of reinforced concrete to be erected on Perry street at an estimated cost of about \$500,000.

St. Luke's Hospital, Utica, N. Y., has let contract for the erection of a boilerhouse, 31 x 70 ft.

The McLaren Knitting Company, West Sand Lake, N. Y., has had plans prepared for a three-story and basement factory, 66 x 110 ft. Bids will be taken about July 1. The estimated cost is \$60,000.

Architects Green & Wicks, Buffalo, are preparing plans for an addition to the central heating plant at Cornell University, Ithaca, N. Y., at an estimated cost of \$35,000.

Plans have been completed for the three-story and basement factory, 50 x 106 ft., of brick and steel, to be erected this summer by the Crescent Tool Company, Jamestown, N. Y.

The DuBelle Grape Juice Company, Silver Creek, N. Y., has plans ready for bids for a steel and brick factory, 50 x 200 ft., one story and basement and a power house, 30 x 50 ft., estimated to cost \$30,000. L. J. Dubelbeis, Irondequoit, N. Y., is president.

The American Locker Company, Arkay Building, Albany, N. Y., plans to have its product manufactured by contract for the present. J. Y. Read is president, and A. J. Little is general manager.

The Degnon Realty & Terminal Company, 30 East 42d street, New York, has had plans drawn for a four-story concrete factory, 80 x 160 ft., to be erected on Anable avenue, Long Island City, at an estimated cost of \$90,000. William Higginson, 21 Park row, New York, is the architect.

Baltimore

BALTIMORE, MD., June 14, 1915.

Additions to cost \$2000 are to be made to the plant of the Modern Machinery Company, Fifth and Monroe streets, Wilmington, Del. The contract for the construction has been awarded George S. Charles & Son, Wilmington.

The American Glycerine Company, Wilmington, Del., has increased its capital stock from \$100,000 to \$400,000.

The Wilmington Fibre Specialty Company, New Castle, Del., will be ready to begin operations about July 1.

Laurel, Del., plans installing two new pumps at the central pumping station. The cost will be about \$2200.

The E. I. Du Pont de Nemours Powder Company, Wilmington, Del., which is operating a plant at City Point, Va., has secured control of the Ettrick and Matoaca cotton mills in Virginia, and will devote them to the manufacture of gun cotton. It will build a second plant at City Point to give employment to about 1000 men.

The first floor of the large Center Market is to be made into a garage by H. D. Caplan, who has leased the property from the City of Baltimore.

A garage, 65 x 118 ft., is to be built by J. L. Miller at 2330 to 2336 McElderry street, Baltimore. It will cost about \$5000.

Eight large piers are provided for in plans drawn by Major Joseph W. Shirley, chief engineer of the Topographical Survey, Baltimore, for increasing the harbor facilities.

The Standard Garage Company has been incorporated by Harry Hoffberger, 431 North Front street, Baltimore; Harry Goldberg and Richard H. Diggs, with a capital stock of \$10,000.

Philadelphia

PHILADELPHIA, PA., June 14, 1915.

The Lukens Iron & Steel Company, Coatesville, Pa., is working up plans for a plate mill to turn out unusually wide plates.

An addition, 80 x 600 ft., is to be made to the boiler shop of the Eddystone, Pa., plant of the Baldwin Locomotive Works. It is said the building will be used for the manufacture of rifles for the allied nations. The new structure is to be a woodworking shop, and it is presumed it will be used for the manufacture of stocks. It will be three stories and it is expected to be completed by September 1.

A new mill for the manufacture of seamless high-pressure gas tanks was recently put into operation by the Tindel-Morris Company, Chester, Pa., and a large force of men is at work day and night.

The Pennsylvania Iron Works Company, Eddystone, Pa., is busy machining forgings. The war has brought about a great increase in business for this company.

The Federal Steel Foundry Company, Chester, Pa., is being kept busy with orders for ship castings.

According to J. H. F. Dixon, vice-president of the Keystone Steel Castings Company, Chester, Pa., which has been closed down, plans beginning operations in the near future.

It is reported that the Pennsylvania Trojan Powder Company, located on the Catasauqua & Fogelsville Railroad, near Catasauqua, Pa., is being doubled in capacity.

Coatesville, Pa., has sold \$185,000 of bonds and has awarded contract for the construction of a waterworks.

Philadelphia, Pa., has voted \$195,000 for pumping machinery to replace the present equipment at the Shawmont & Roxborough pumping stations. C. E. Davis is chief of the water bureau.

Hoffman Brothers, 431 West Clark avenue, York, Pa., have been organized by George E. Hoffman, formerly of the Morris Iron & Steel Company, Frederick, Md., and Ralph Hoffman, formerly of the Stacy-Schmidt Company, York, Pa. It will do a general pattern-making business and conduct an ornamental wood-working shop.

Contract has been awarded to Barclay White & Co., Perry Building, Philadelphia, for the construction of a one-story brick addition to the factory of MacAndrews & Forbes Company, 87 x 91 ft., to cost about \$10,000. Jacob O. Clarke, 133 South Twelfth street, is the engineer.

The American Car & Foundry Company has announced the expenditure of more than \$50,000 on improvements to its plant at Milton, Pa., including an additional shop, 100 x 350 ft., an extension to the steel storage yard 120 ft. long, an extension to the tank car plant 100 ft. long and the addition of considerable machinery to increase the capacity of the plant. B. Budd Cannon is resident representative.

Metager & Fisher, 710 Deuckla Building, Philadelphia, has taken out permits covering the construction of a six-story reinforced concrete factory, 23 x 104 ft., to be erected at 210 South Thirteenth street, Philadelphia, at an estimated cost of \$45,000, for James K. Davidson's Sons.

The Gamble Fuel Briquetting Company, Harrisburg, Pa., has been organized by John M. Delaney and others to manufacture smokeless fuel briquettes from culm. It will develop a capacity of 20,000 to 25,000 tons a year. John M. Delaney is president and general manager; George E. Hartmann is treasurer, and H. S. Hill, secretary. The company has secured a site at Ninth and Dock streets, and has placed an order for briquetting machinery with the Mashek Engineering Company, 90 West street, New York.

New England

BOSTON, MASS., June 15, 1915.

General conditions cannot be said to have changed a great deal in the past week. Some improvements have been noted in lines outside of the metal industry. Cotton manufacturers report very large orders for shipment to England, including print goods, the understanding being that much of this material will replace German products. Probably much of it will be re-shipped by British exporting houses to the colonies and to other countries in various parts of the world. The shoe manufacturers are complaining, especially those who make the better class of goods. Some of the manufacturers of worsteds are doing a large business; but the woolen trade proper is not active, although, as a matter of fact, it has been inactive for some years.

When it comes down to the metal lines the average condition is of boom-like proportions. To tell of this is to repeat what has been said in previous weeks. The brass manufac-

turers are tied up with orders which are keeping them operating day and night.

The machine-tool situation possesses a new interest because of the fact that tool builders are now receiving the assistance of shops which had not been considered available for the purpose. For example, the printing press industry is exceedingly dull, and New England has several large plants which are devoted to this branch of manufacturing. These companies are now coming forward with offers to take on work for the machine-tool people. So also have a few of the textile machinery builders. As has been stated in this column, a great amount of machine tools have been contracted for because of the assistance rendered by outside establishments; but hitherto most of these have been works more or less closely identified with the industry. For example, one large builder of engine lathes is having work done by 24 outside concerns, and is now able to take on new orders of large magnitude, running into hundreds of thousands of dollars, because of the unexpected assistance which has been proffered.

The pressed metal and screw machine products people are just as busy as they have been. As for the manufacturers of forgings, there is no limit to what they could take on in the way of business because of the enormous demand for shrapnel. The only drawback is a scarcity of machinery. It is also understood that these projectiles are being made from solid bar stock on the heavy types of turret machines, and also in some cases with the combination of ordinary heavy engine lathes and drilling machines. The demand for shells of larger sizes is equally great.

The influence of all this business is far reaching. It spreads away in all directions. Every manufacturer of materials or supplies is affected very directly. The cry everywhere is for mechanics, and industrial centers where business did not respond quickly are suffering because of the migration of their men to those places which have been so highly advertised as busy through the news columns of the daily press and through straight advertising and the personal soliciting of agents.

The plant of the Hopkins & Allen Arms Company, Norwich, Conn., has been purchased by interests closely allied with the Union Twist Drill Company, Athol, Mass., and the Baush Machine Tool Company, Springfield, Mass. The company has been a Connecticut corporation. The reorganization changes the name to the Hopkins & Allen Arms Company of Massachusetts. John A. McGregor, of the Union Twist Drill Company, is the president; George S. Watts, treasurer; J. H. Drury, of the Union Twist Drill Company, assistant treasurer; and these men, with August P. Loring, president, and J. A. Eden, works manager of the Baush Company, and William Watts, constitute the board of directors. Messrs. Watts have been conspicuous in the management of the Hopkins & Allen Company. The new corporation has just booked an order for 400,000 Lee-Enfield rifles, the standard English arm. The works at Norwich will be increased in a very large way by the erection of three buildings which will give much more than twice the present floor space, and new equipment will afford a correspondingly increased production capacity.

The plant of the C. G. Allen Company, Barre, Mass., manufacturer of sensitive drilling machines and gray-iron castings, was not very seriously damaged by the recent fire, which was confined to the old foundry formerly occupied by the Heald Machine Company, Worcester, and recently leased by the Allen Company. No valuable patterns were lost. The work of replacing the building and installing a new 10-ton cupola and a blower is being rushed, and the completion of the improvements will give increased capacity as compared to the old equipment, and will supplement in a larger way the product of the Allen Company's own foundry. The company is rushed with business, but the fire will not put back deliveries of machinery.

The Taft-Pierce Company, Woonsocket, R. I., manufacturer of machinery and other metal products, has awarded the contract for a three-story brick storehouse, 32 x 140 ft., and contemplates erecting a four or five-story concrete structure for the blacksmith shop, painting department and for the storage of patterns. These departments now occupy wooden buildings.

The Potter & Johnston Company, Pawtucket, R. I., is operating its large shops with night and day shifts.

The Bosch Magneto Company's plans for the increase of its works at Springfield, Mass., call for a building, 170 x 250 ft., three stories, of brick and steel. The statement is given out that, as the Springfield factory has been in a large way an assembling plant, the parts coming from the home works in Germany, and this supply now having been cut off, manufacturing will now be undertaken here on a growing scale.

Announcement is made in New Haven that the shops of the New Haven Mfg. Company have been sold, the purchasers named being F. W. Childs & Co., 56 Liberty street, New York,

export and manufacturers' agents. The understanding in New Haven is that the plant will be operated for the Westinghouse Company, in connection with the recently purchased Stevens factories in Chicopee and Springfield, Mass. The New Haven Mfg. Company formerly manufactured engine lathes and other machine tools, but abandoned business some time ago. The shops contain much metal-working machinery.

The Japanese Tissue Mills, Pearl City, Mass., will add a machine room.

The Heim Machine Company, Danbury, Conn., will build a two-story addition, 30 x 60 ft.

The Anderson Die Machine Company, Bridgeport, Conn., has been incorporated with authorized capital stock of \$25,000. The incorporators are Nils H. Anderson, East Hampton, Conn., and Christian M. Newman and Leonard H. Anderson, Bridgeport.

The Waterbury Welding Company, Waterbury, Conn., will build an addition, 18 x 80 ft.

The Maine Central Railroad will carry out plans, already mentioned, for an addition to its repair shops at Waterville, Me., according to word from that place. The building contract calls for an expenditure of \$60,000, it is said, and doubtless heavy machinery will be required.

Mr. Thomas O'Leary has acquired the control of the business of the L. W. Pond Machine & Foundry Company, Worcester, Mass., having purchased the interests held by the Prentiss Tool & Supply Company, New York. The company makes gray-iron castings. It is now increasing its plant, as has been stated.

The Hartford Chamber of Commerce, Hartford, Conn., is taking the initial steps toward the erection of another industrial building, for the floor space of which it has applicants. The first structure built by the organization is now occupied by the Underwood Typewriter Company. The second, completed perhaps two years ago, is the home of the Arrow Electric Company and the John Underwood Company, which occupy all of the space.

Chicago

CHICAGO, June 14, 1915.

It is a reasonable supposition that a fair proportion of the orders coming in from the trade which appear to be occasioned by war business includes some that would have come in, perhaps not so urgently, but in due time. It is unquestionable that many manufacturers are making war orders bear the cost of new equipment which they were needing anyway but lacked the immediate necessity of installing. In contemplating the apparent dearth of domestic business this phase of the situation should have consideration. There is reason to believe that the long delayed placing of the Burlington railroad requirements has been due to investigations of types of machines best suited to meet the shop needs of the road and that the near future will bring the purchase of the equipment for which inquiry was made.

The Laboratory Metal Goods Company, Chicago, has been organized in the office of Thomas P. Octigan, 105 West Monroe street, with a capital of \$1000.

R. M. Hvid & Co., 86 South Dearborn street, Chicago, manufacturers of gasoline engines, have taken out a charter of incorporation with a capital of \$50,000.

The Universal Safety Lock Company, Chicago, has been organized by Howard L. Mason, William N. Mitchell and John N. Lucas, with an authorized capital of \$100,000 and may be addressed in care of William N. Mitchell, 4337 Greenwood avenue.

The American Pattern & Model Company, 2059 Walnut street, Chicago, has filed notice of an increase in its capital stock from \$10,000 to \$12,000.

The Kedzie Foundry Company, Chicago, has been formed with a capital of \$15,000 by G. Erlandson, John E. Erickson and George R. Harbaugh. Its present mail address is in care of George R. Harbaugh, 10 South LaSalle street.

The Universal Portable Engine Company, Chicago, incorporated with a capital of \$10,000 by L. J. Doyle, John T. Evans and LeRoy Hackett, plans to place on the market an engine of new design.

The Vacuum Washer Works, Forrester, Ill., is making inquiry for second-hand machinery, including a shaper, punch press, drill presses and transmission equipment. It also desires to secure sheet metal-working machinery. A. J. Rupert is in charge.

F. C. Jorgeson & Co., 159 North Ann street, Chicago, manufacturers of show cases and store fixtures, have acquired property at Rockford, Ill., upon which it is the expectation to build a manufacturing plant at once.

The Michaelman Steel Construction Company, Second

and Hampshire streets, Quincy, Ill., is building an addition to its plant, 109 x 133 ft., two stories, to cost \$8000.

The Western Seamless Pail Company, St. Charles, Ill., has been organized with a capital of \$10,000 by John H. Andrews, Francis Adams, Jr., and George B. Price, to conduct a sheet metal working business.

The Sweet Adding Machine Company has completed arrangements for the leasing of the plant formerly occupied by the Veneered Door Company, at Richmond, Ind.

The Wrought Iron Heating Company, Des Moines, Iowa, is preparing plans for a foundry which will cost \$20,000. The company recently completed other factory buildings at a cost of \$25,000.

The Burd High Compression Ring Company, Rockford, Ill., increased its capital stock from \$50,000 to \$200,000 for the purpose of adding equipment and enlarging its business.

The D. L. Davis Company, Ft. Madison, Iowa, manufacturer of tire inflators, has acquired a site in that city on which a factory will be erected.

The Cedar Rapids Foundry & Machine Company, Cedar Rapids, Iowa, announces an increase in its capital stock from \$25,000 to \$50,000, to provide for the expansion of its business. The company manufactures furnaces and farm machinery. C. J. Phillips is vice-president and general manager.

Orange City, Iowa, has voted \$10,500 of bonds for waterworks improvement.

The Mayer Brothers Company, Mankato, Minn., has plans completed for the erection of a machine shop, forge shop and foundry, to be built of steel and concrete and equipped with overhead traveling cranes.

The Colorado Agricultural College, Ft. Collins, Col., will begin work on the construction of a heating plant to cost about \$50,000.

Detroit

DETROIT, MICH., June 14, 1915.

The demand for standard lines of tools and machinery continues active, although sales for the past week have been mostly for single tools. Some demand for wood-working equipment is noted, this class of machinery having been rather quiet for some time past. Quite a volume of business is being transacted by the second-hand machinery dealers. Inquiry is lighter, but steady. A better volume of work is being done along the lines of new construction and a number of new projects of interest are reported by the architects.

The Fisher Body Company, Detroit, manufacturer of automobile bodies, has purchased a three-acre site improved with a four-story factory building, 65 x 250 ft., from the Universal Motor Truck Company. In addition to occupying the present building the company will erect a mill building 80 x 300 ft., and two dry kilns, each 60 x 80 ft. The new plant will be placed in operation as quickly as possible.

The Detroit Pneumatic Chuck Company, Detroit, has been incorporated with a capital stock of \$30,000 to manufacture chucks, etc. The incorporators are George W. Morrison, Lee M. White and Edward A. Harding.

The Hahn Specialty & Machine Company, Detroit, has taken out a building permit covering the erection of a one-story factory, 22 x 60 ft., to cost about \$2500.

The Chalmers Motor Company, Detroit, has had plans drawn for a four-story addition to its No. 5 building. Several manufacturing departments will be enlarged upon the completion of the new addition.

The Russell Motor Axle Company, Detroit, has commenced the construction of a building 120 x 120 ft., adjoining its present plant. The company reports that its business is showing a very rapid growth.

The Timken-Detroit Axle Company, Detroit, has two new buildings under construction, a four-story manufacturing building and a two-story forge shop, both of brick and steel.

John B. Corliss, 1824 Ford Building, Detroit, has taken out a building permit covering the erection of a five and one story reinforced concrete factory, 98 x 133 ft., to cost about \$35,000.

The Federal Brass Works, Detroit, has filed articles of incorporation giving its capital stock as \$50,000. Charles R. Murphy is the principal stockholder.

The Pronovost Torsion Spring Wheel Company, Detroit, has been incorporated with \$50,000 capital stock to manufacture torsion spring wheels for motor vehicles. The incorporators are Joseph and Hubert Pronovost and George H. Ropes.

The building occupied jointly by the John Lauer Machine Company and the Monarch Mfg. Company was damaged by fire June 7 to the extent of about \$10,000. Contrary to reports appearing in the daily press the companies state that little damage was done to the machinery.

It is reported from Grand Rapids, Mich., that the Austin Automobile Company of that city will erect a new plant.

The Ottawa Leather Company, Grand Haven, Mich., is having plans prepared for a new yard building, 110 x 130 ft.

The plant of the Luther Milling Company, Reed City, Mich., recently destroyed by fire, will be rebuilt immediately.

The Continental Motor Company is enlarging the machine department of its Muskegon, Mich., plant. It is reported that the company is negotiating for part of the plant of the bankrupt Racine Truscott Shell Lake Coat Company.

The Traverse City Iron Works, Traverse City, Mich., has secured the contract for the construction and installation of the new waterworks plant at Marion, Mich.

The Frugale Machine Company, Whitehall, Mich., will erect a small hydroelectric plant near that point.

The Spencer-Smith Company, Howell, Mich., is erecting an addition to its plant to provide for a heat-treating department.

The Benton Harbor Malleable Iron Company, Benton Harbor, Mich., is constructing an addition to its plant, to be used as a drop forge shop, the completion of which is expected by Sept. 1.

The Boyne City Chemical Company, Boyne City, Mich., has awarded contracts for equipment for its addition to the power plant at an estimated cost of about \$20,000.

Indianapolis

INDIANAPOLIS, IND., June 14, 1915.

The Special Machinery & Foundry Company, Martinsville, Ind., has let the contract for the construction of a brick factory, 160 ft. square.

The American Rotary Valve Company, Anderson, Ind., has completed its new foundry and is now prepared to operate.

The International Machine Tool Company, Indianapolis, has taken out a permit providing for an addition to its plant, to cost \$15,000.

The United Mfg. Company, Indianapolis, has been incorporated with \$150,000 capital stock to manufacture articles of trade. The directors are W. F. Wells, G. L. Helms and E. D. Gray.

The Strauss Service System, Indianapolis, has been incorporated with \$5000 capital stock by C. T. Strauss, Jerome Lyon and J. C. Brannum to manufacture and repair motors and make motor accessories.

The Morocco Utilities Company, Morocco, Ind., has been incorporated with \$25,000 capital stock to supply water. The directors are A. D. Peck, L. S. Recher and C. E. Triplett.

The Rapid Barrel Opener Company, Evansville, Ind., has been incorporated with \$10,000 capital stock to manufacture barrel openers. The directors are E. P. Hahn, H. B. Cook and S. F. Goodman.

The school trustees, Muncie, Ind., will receive bids June 24 for lathes, etc., for the new high school. Vincent W. Jones is secretary.

Cleveland

CLEVELAND, OHIO, June 15, 1915.

The feverish activity of the machine-tool market, due to the recent heavy demand for machines for making war material and additional round lot inquiries, has died down somewhat; but the demand continues fairly active. Considerable inquiry has come from other sections, particularly from the East, for machinery for making war munition; but no new local inquiries of any size for machine tools for this purpose have come out. New business is coming from machine-tool builders themselves, who are enlarging the capacity of their plants to take care of the increased business. Dealers report that their volume of business could be considerably larger if they were able to make the deliveries wanted. The scarcity of skilled labor recently noted has extended to forge shop men. Conditions in the foundry trade are fairly good. Most jobbing foundries are well filled with work.

The Warren City Tank & Boiler Co., Warren, Ohio, is in the market for equipment for its new plant, work on which is well under way, the foundations being ready for the structural steel. It will be erected by the McClintick-Marshall Company. Bids have been taken for eight cranes—two 15-ton, with 51-ft. span; two 10-ton, with 40-ft. span and four 15-ton, with 18-ft. span. Quotations have also been received for two large riveting machines and a flange machine. Other equipment that will be purchased includes a large punch and a large rotary shear with a capacity of $\frac{1}{2}$ in. to $\frac{3}{4}$ in. The company will also install a complete power plant, including a 500 to 600-hp. engine, generators, motors, air compressors, etc. Specifications for these will

be out in a short time. The main building will be 115 x 532 ft. It is expected that it will be ready for occupancy about December 1.

The Cleveland Modern Foundry Company has been incorporated with a capital stock of \$5000 by F. W. Zimmerman, M. J. McCarthy, H. E. McCormick, and others.

The Cleveland Hardware Company, Cleveland, will install an electrical drive in its rolling mill department to take the place of the present steam drive. The company has placed an order for a special Westinghouse mill motor for operating its rolling mills.

The Cleveland Motor Cycle Company, Cleveland, has been incorporated with a capital stock of \$100,000 by M. F. Mooney, J. L. Bushes, W. J. Mahon, and others.

The Brennan Steel Castings Company, Cleveland, has built a 50 x 150-ft. addition to its plant and expects to purchase some new equipment, including sprue-cutting machinery and molding machines.

Sealed bids will be received at the office of the clerk of the Board of Education, Cleveland Heights, Ohio, July 6, for heating equipment for the Cleveland Heights high school, and also for installing the mechanical equipment. Walker & Weeks, 1900 Euclid avenue, Cleveland, are the architects.

The F. B. Stearns Co., Cleveland, will enlarge its plant by the erection of a five-story concrete building, 75 x 1075 ft. Additional equipment will probably be purchased.

The Empire Rolling Mill Company, Cleveland, has increased its capital stock from \$300,000 to \$500,000.

The Electro Galvanizing Company, Cleveland, has been incorporated with a capital stock of \$10,000 by G. R. Aitken, H. H. Bolton, and others.

The Cleveland Welding & Mfg. Company, Cleveland, maker of automobile wheel rims, has awarded a contract for the erection of a new plant extension that will provide 27,000 sq. ft. of additional floor space. The company has placed orders for much additional special machinery.

The National Electric Welder Company, Warren, Ohio, has completed the remodeling of the Day Ward foundry building, into which it will move in a few days. The new plant, which will occupy a building 80 x 200 ft., will enable the company to largely increase its output of welding machinery. It is arranging to increase its line by the manufacture of extra heavy welders.

The Western Reserve Steel Company, Warren, Ohio, has installed a new set of cold rolls in its sheet mill plant, making three sets of cold rolls in all. The new equipment was furnished by the Hyde Park Foundry & Machine Company. The Western Reserve Company is now in the market for a 10-ton crane.

The Firestone Tire & Rubber Company, Akron, has plans under way for the erection of two additional factory buildings.

The Akron Gas Lamp Company, Akron, will erect a two-story factory, 60 x 80 ft.

Sealed bids will be received by Vance Hickin, clerk of council, Rittman, Ohio, June 29, for a 50-hp. horizontal gas engine, a triplex pump of 400 gal. per min. capacity, two air compressors, a motor-driven multi-stage centrifugal pump of 200 gal. per min. capacity, other pumping equipment, etc. W. F. Peters, Medina, Ohio, is the engineer; and R. Winthrop Pratt, Hippodrome Building, Cleveland, is the consulting engineer.

The Kenton Gas Engine Company, Kenton, Ohio, has changed hands. The plant has been purchased by T. A. Taylor and D. L. Tullis, the business to be conducted under the name of the T. & T. Mfg. Company. It will continue the manufacture of gas and gasoline engines and manufacture hot-air heaters and probably hot-water heaters. Mr. Taylor has been the manager of the company for some time.

The Mybro Heating & Mfg. Company, Canal Dover, Ohio, has been incorporated with a capital stock of \$1000 by L. R. Hildreth, H. W. Edwards, O. S. Larkde, and others.

The Dauch Mfg. Company, Sandusky, Ohio, will enlarge its plant by the erection of a building, 30 x 180 ft., to be used as a blacksmith and wheel-making shop.

Ralph H. Seabury, formerly of Wellsville, N. Y., has established a plant in the Toledo Factories Building, Toledo, Ohio, for the manufacture of brushes for automobile motors.

The F. W. Zeig Mfg. Company, Fredericktown, Ohio, will erect an addition to its plant.

It is announced that the plant of the Perfection Road Machinery Company, Gallion, Ohio, will be taken over by the J. I. Case Threshing Machine Company, Racine, Wis., which has had an option on this plant for some time. It is expected that the Gallion plant will be shut down.

South Charleston, Ohio, has voted \$30,000 of bonds for the construction of a municipal waterworks.

Cincinnati

CINCINNATI, OHIO, June 14, 1915.

Numerous reports have been circulated to the effect that several Cincinnati firms were making shrapnel, some of these rumors being given publicity by the daily press. It can be stated positively that no manufacturer in Cincinnati has any contracts for either forging or machining shells of any kind, and, as far as is known, no one here anticipates taking on any business of this character.

The machine-tool situation is rather peculiar. While all plants are working on full time, local machine-tool builders, as a rule, believe that the foreign demand has about reached the limit, and already there has been a slackening of inquiries from abroad. The domestic business is improving some; but practically all orders are from firms making war materials, who want the tools on prompt shipment. Orders placed by firms making war munitions for tools for forward delivery are not as acceptable as may be supposed, no matter how high the standing of the possible purchaser. It is realized that should the demand for ammunition suddenly cease it would bring about the cancellation of orders from domestic customers, whose requests could not well be denied. Lathes and vertical milling machines are still in the lead, but lately a number of planer orders have been received from domestic sources.

The railroads are still holding back, but it is reported that the Chicago, Burlington & Quincy lately sent a delegation of shop experts to visit plants in this territory, and that a good-sized list will be issued by that road at a later date.

Small and medium-sized dynamos and motors show an improvement, and plants making these are busier than they were six weeks ago. The larger electrical units are not in much demand. Tool steel agencies all report an excellent business, that does not now show any signs of falling off.

The Bickett Machine & Mfg. Company, Hopkins and Cutter streets, Cincinnati, manufacturer of special machinery for making envelopes, tobacco bags, etc., has purchased the plant and machine shop of the old Eureka Foundry Company, on Richmond street, including a one-story foundry and a five-story manufacturing building, both of brick. The new plant will be fitted up at an early date. Considerable special machinery and other equipment will be required.

It is reported that the American Foundry & Machine Company, Hamilton, Ohio, has had plans prepared for an addition to its plant that will be 90 x 100 ft., one story, of brick construction.

The Hewitt Brothers Soap Company, Dayton, Ohio, whose tentative plans were recently mentioned, has now definitely decided to enlarge its plant, installing considerable special equipment.

Pierce D. Schenck, Dayton, Ohio, formerly connected with the Dayton Malleable Iron Company, is reported to have leased part of the plant of the Dayton Foundry Company, and will operate it at an early date.

The addition to the plant of the Maxwell Motor Car Company at Dayton, Ohio, recently mentioned as contemplated, will be 100 x 365 ft., one story, of brick construction. Work will be commenced at an early date.

The Central South

LOUISVILLE, KY., June 14, 1915.

Business is improving steadily with machinery houses, those making heavy equipment especially being favored with orders the past week. Prospects continue good, and the summer will likely be much more active than had been expected up to a few weeks ago. The demand for boilers is active, and electric power equipment is also selling well, though manufacturers of this class of equipment report that prices are being cut severely in competitive bidding. Large building operations are more numerous than they have been, and the development of this class of work will help the business of a good many machinery makers.

The O'Donnell Coal Company, Twenty-ninth and Cleveland streets, Louisville, has begun the equipment of a gravel elevator, which will be electrically operated.

The West Engineering Company, 233 South Fifth street, Louisville, has been incorporated with \$5000 capital stock by William M. West and others, and will install power plants and fuel-saving devices. It will deal in power equipment.

The Sharpsburg Electric Light Company, Sharpsburg, Ky., has been organized and will install a street-lighting system.

The Morton's Gap Ice & Light Company, Morton's Gap, Ky., has been incorporated with \$10,000 capital stock by W. W. Kington, Katherine Oates, and others.

The Carlisle Electric Light & Power Company, Carlisle, Ky., will spend \$15,000 in the equipment of an ice factory, to be operated in connection with its power plant.

The Carlisle Garage Company, Carlisle, Ky., has been incorporated with \$3000 capital stock, and will equip a garage and repair shop. Robert Harper may be addressed.

The Foreman Automobile Company, Paducah, Ky., will build a garage and will equip a machine shop for repair work.

The Twentieth Century Metallic Packing Company, Lexington, Ky., has decided to have its product made by contract at present. Thomas G. Saxton is president.

The Central City Power Company, Central City, Ky., has been organized by R. E. Vincent, C. E. Blackwell and W. C. Coffman.

F. H. Heiskell, Memphis, Tenn., has had plans prepared for a two-story brick machine shop to cost about \$10,000.

The Kentucky Public Service Company, Bowling Green, Ky., plans to improve its electric light plant at Clarksville, Tenn. H. D. Fitch is manager.

The Tennessee Power Company has filed a \$50,000,000 mortgage at Maryville, Tenn., to secure a bond issue for the purpose of financing water-power developments in Tennessee.

The Fulton Company, Knoxville, Tenn., which manufactures heating regulators, has begun work on the construction of a steel and brick factory to cost \$50,000. The equipment will be purchased shortly.

The Merchants' Cotton Company, Lexington, Tenn., will need power equipment for the operation of a gin.

The Jones Strainer Mfg. Company, Lexington, Tenn., will manufacture a well strainer. Its factory will be built at once. Eli Jones, W. W. Sweatt, and others, are stockholders.

J. Gutman, Bristol, Tenn., has purchased the plant of the Iron City Foundry & Stove Works, and will increase the capacity of the foundry considerably.

J. O. Griffith and Ira J. Hoover, who are interested in the establishment of a phosphate plant near Centerville, Tenn., are now purchasing the equipment.

The Littlefield-Steele Company, Knoxville, Tenn., will erect a factory costing \$30,000. It will be 87 x 100 ft.

The Nashville, Springfield & Northern Railroad, Nashville, Tenn., plans to construct a number of electric lines. The first road will run from Nashville to Franklin, Ky. E. G. Stribbling, Nashville, is president, and R. C. Leonard, Nashville, secretary and treasurer.

Caldwell Brothers, Columbia, Tenn., are asking for prices on a second-hand stationary steam engine.

The Winchester Garage & Machine Shops, Winchester, Tenn., has been incorporated with \$15,000 capital stock by B. A. Grisard, W. E. Walker, and others.

The Braemer Power Company, Braemer Falls, Tenn., will develop 1000 hp. at Braemer Falls, and will transmit current to Elizabethton, Tenn. The plant will cost \$60,000.

Birmingham

BIRMINGHAM, ALA., June 14, 1915.

Machinery dealers report that bettered conditions in the general market noticed the past two weeks continue with a greater variety of customers than for some time. Electrical apparatus and gasoline engines are the dominant features, with pumps and boilers in good demand. Collections have improved.

The Cruse-Crawford Company, Birmingham, manufacturer of wagons and trucks, will build a factory at a cost of \$25,000. W. T. Warren is the architect.

J. F. Lumpkin is general manager of the Etowah Marble & Granite Company, which proposes to establish marble and granite works at Attalla, Ala.

The Gulf States Steel Company, Birmingham, will extend blooming mill at Gadsden by installing additional gas producers, overhead crane, etc., at a cost of \$60,000.

Kratzer Ice Cream Company, Montgomery, Ala., will build a 15 to 20-ton ice plant at Selma.

A meat-packing plant at Huntsville, Ala., is planned by W. M. Jenkins, Pittsburgh, Pa.; W. F. Garth and Clarendon Davis, Huntsville, and others. It will cost \$50,000.

The Georgia Cane Products Company, Columbus, Ga., will build coal chutes on the river front.

The Great Bend Phosphate Company, Live Oak, Fla., has been organized by W. L. Fedder, B. W. Helvenston, C. F. Holbrook, and others, and proposes to develop 1200 acres of phosphate land. The capital stock is \$25,000.

J. L. Mansfield and others have organized the Anniston Can & Machine Company, Anniston, Ala., for the manufacture of canning machinery, and supplies.

Fletcher & Jones, Panama City, Fla., will establish a machine shop.

St. Louis

ST. LOUIS, MO., June 14, 1915.

The improvement of the machine tool demand is slow. Caution dominates the present situation, and expansions industrially in the territory tributary to St. Louis will continue slow for some time. The inquiry for tools is still of the single machine type. Replacement orders are a little more frequent and some inquiry is noted for second-hand tools. Requirements for expansion continue small and also difficult to get.

The Tynnot Machine Company, St. Louis, Mo., has been incorporated with a capital stock of \$18,500 by Henry H. and Roy W. Brockman and Frederick Demko, Jr., and will manufacture package wrapping and tying machines.

The Wayne Trunk Company, St. Louis, Mo., has acquired property, 125 x 187 ft., upon which it will build a machine shop and garage.

The Wizard Foot Appliance Company, St. Louis, Mo., has been incorporated with a capital stock of \$25,000 by H. L. Gardner, J. F. Brockland and J. B. Reinhart and will manufacture foot corrective appliances.

The Philip A. Rohan Boat, Boiler & Tank Company, St. Louis, Mo., recently reported incorporated with \$25,000 capital, is reported in the market for boiler shop tools and alternating-current motors.

G. H. Ten Broeck, St. Louis, Mo.; John H. Bernhard, of New York and New Orleans, and others, have plans for the operation of steam barges on the Mississippi River and also the equipment of mechanically-operated loading stations at various points.

The J. A. McBride Mechanical Equipment Company, St. Louis, Mo., has been incorporated with a capital stock of \$16,000 by James A. McBride, E. W. Sullivan and C. G. Van Horn.

E. M. Worthington, St. Louis, Mo., will increase the capacity of his public garage and will install additional mechanical apparatus and repair equipment, etc.

The Aylsworth-Neal Tomlin Grain Company, Kansas City, Mo., has increased its capital stock from \$100,000 to \$250,000 and will increase its elevator capacity.

The Macon Machine Company, Macon, Mo., has been incorporated with a capital stock of \$25,000 by Harry F. Huncker, W. D. Coulter and W. G. Miller, and will equip a plant.

The Producers Refining Company, Kansas City, Mo., has increased its capital stock from \$600,000 to \$800,000.

The Gate City Motor Company, Kansas City, Mo., has been incorporated with a capital stock of \$10,000 by H. P. Sutton, J. R. Castor and W. C. Riggs.

The Keytesville Electric Light & Power Company, Keytesville, Mo., will install two units of 25-hp. each, together with transmission system, etc. R. W. Cropper is manager.

Under a bond issue voted at Kansas City, Mo., \$300,000 will be expended upon a garbage disposal plant. Henry J. Yost is mayor.

The Pierce Oil Corporation, St. Louis, Mo., will add a wax plant to its oil refinery at Kansas City, Mo., at a cost of about \$600,000.

Additional waterworks capacity to cost about \$26,000 will be installed by the town of Lee's Summit, Mo. Henriel, Kent & Lowry, Kansas City, Mo., are the engineers.

The Fouke Gin Company, Fouke, Ark., has been incorporated with a capital stock of \$10,000 by J. L. Crane, C. W. Fouke and W. T. Murphy.

The Arkansas Light & Water Company has bought the electric plant at Marianna, Ark., and will add some equipment.

Harrison, Ark., will equip a water system, including an oil engine, a pump of 500,000 gal. daily capacity, etc. M. A. Earl & Co., Muskogee, Okla., are the engineers in charge.

An interurban railway between Huntsville, Ark., and the St. Louis & San Francisco Railroad is to be equipped with powerhouse, etc. The mayor of Huntsville should be addressed.

The Keystone Bridge Company, Keystone, Okla., has been incorporated with a capital stock of \$10,000 by J. H. Fleming, S. M. Woodward and S. R. Morris.

A. D. Brown, Anadarko, Okla., is in the market for machinery for an 80-saw cotton gin.

The Chickasha Cotton Oil Company, Chickasha, Okla., will install a ginnery.

The Haskell County Gin Company, Stigler, Okla., has been incorporated with a capital stock of \$15,000 by W. B. Fears, C. C. Boller and J. Covey.

Antlers, Okla., has voted to install an electric light system and to add to the waterworks plant equipment.

Charles Petty, Oilton, and Harry Badger, Kiefer, Okla., will install an electric light and power plant at Oilton, Okla., to cost \$25,000.

Marshall, Okla., will expend \$5000 on equipment for an electric light plant, the Benham Engineering Company, Oklahoma City, Okla., having charge of the work.

J. D. Keaton and others will equip a flour mill and grain elevator at Prague, Okla., to cost \$20,000.

The Rex Stove Company, Muskogee, Okla., has been incorporated with a capital stock of \$10,000 by James L. Powell, T. M. Yoho, and others.

The Walker Logging Company, Moyers, Okla., has been incorporated with a capital stock of \$75,000 by Henry Walker, T. F. Robinson and John Walker.

Ross & Greis, Tulsa, Okla., will equip a garage and machine shop.

The City of Chandler, Okla., will expend \$5000 on waterworks machinery.

The Harris Brown Table Company, Denver, Colo., has bought a factory at Greenville, Miss., and will install machinery for the manufacture of furniture.

Tuscaloosa, La., has voted \$13,000 of bonds for a municipal waterworks.

The Pacific Northwest

SEATTLE, WASH., June 8, 1915.

Current business shows little gain, but grounds for encouragement for the future are appearing. One of the most important is the prospect of increased export trade. Large inquiries, and not a few orders, have lately been received on the Pacific coast from Australia and other countries for classes of merchandise not hitherto imported from the United States, and some exporting firms report exceptionally active business. Shipping facilities continue very inadequate; but many vessels have lately been secured for the exportation of lumber, as well as of new-crop grain. Business in mill equipment consists of little beyond routine replacements. The demand for mine equipment for the interior and Alaska is showing up well. Crops are in good shape, and all kinds of implements and farm machinery are moving well.

The Astoria Machine Works, Astoria, Ore., has just completed the installation of new equipment, including two radial drills, a punch and shear, a shaper, and one 16-in. and one 28-in. lathe.

The Vermont Association, Seattle, Wash., has secured a patent to large limestone properties near Index, Wash., and proposes to begin development work soon.

The National Potash & Iodine Company, Mount Vernon, Wash., has been incorporated for \$25,000, and will erect a plant on Decatur Island for the manufacture of potash and nitrates from kelp. It is understood construction work will begin during the summer.

The factory of the Royal Box & Lumber Company, Cove, Ore., was completely destroyed by fire with an estimated loss of \$7000. It is understood it will be rebuilt.

Miles, Mont., plans extensions and improvements to its municipal steam-heating system, estimated to cost \$15,000. J. J. McGill, superintendent of the municipal plant, has prepared plans.

The Studebaker Corporation of America, according to statement of R. E. Benson, vice-president, Detroit, Mich., plans the construction of a distributing plant in Portland, Ore., this summer to cost about \$90,000.

A recent fire completely destroyed the electric coal bunkers of the Pacific Coast Coal Company, Railroad avenue, Seattle, with a loss of more than \$100,000. Arrangements to rebuild immediately are now under way.

Roseburg, Ore., voted a bond issue of \$300,000 to aid Kendall Brothers, Pittsburgh, to construct a railroad from Roseburg to the Cascade national forest reserve and the erection of a sawmill in Roseburg. The company plans to expend more than \$1,250,000.

The Silvana Dairy Company, Mount Vernon, has awarded contracts for erection of a boiler house 16 x 30 ft. New presses will be installed.

Frank Heyde, Tillamook, Ore., has purchased the sash and door factory in Bay City, Ore., owned by C. Christenson, and will remove it to Tillamook and make improvements.

The Portland Cement Company, Roseburg, Ore., which has been in the process of reorganization, will soon commence active operations at its properties at Oswego and on Roberts Creek.

The Oregon Box Factory, South Portland, Ore., plans to establish a sawmill in Bay City.

Herbert Bale and I. T. King, South Bend, Wash., plan the establishment of a brick-making plant in that city.

Canada

TORONTO, ONT., June 14, 1915.

Manufacturers of factory equipment are receiving some fairly good orders from firms working upon munitions of war. From manufacturers not thus employed orders are very small. Until the Western crops are assured manufacturers are not looking for much improvement in business. In the meantime crop conditions continue excellent and bank clearings indicate a slight and continued improvement in business.

In an address before the Canadian Manufacturers' Association, Toronto, on June 10, General Bertram, chairman of the Dominion Shell Purchasing Committee, stated that to date orders for 9,000,000 shrapnel and explosive shells had been placed in Canada. No less than 247 factories are engaged on the work and the weekly wage bill is about \$1,000,000. In the course of a short time the daily output of shells would be 40,000 to 50,000. Referring to the proposal to establish a copper refining industry, he said that within the course of the next three or four months all the copper bands required in the production of shells would be made from the native product.

Reports from Toronto manufacturers of shells are to the effect that the industry has reached a most substantial basis, and that the output is being steadily increased as the percentage of the imperfect shells is being rapidly diminished. Practically every plant is being used or is in the process of preparation for use, and in some cases premiums as high as \$200 a machine are being offered for prompt delivery of lathes and other machine tools.

Northern Electric Company, Ltd., Montreal, has been empowered to manufacture guns, cannon and ammunition.

The Eastern Steel Company, New Glasgow, N. S., is to install machinery for the manufacture of shells. The capacity of the plant is to be 600 shells a day.

Tenders will be received up to June 22 by T. L. Church, chairman of the board of control, Toronto, for machine shop equipment for the high level pumping station.

The plant of the Vallyfield Iron Works, 41 Wellington street, Montreal, was partially destroyed by fire June 8. The loss is \$10,000.

St. Lawrence Machinery Company, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 to carry on business as machinist, tool maker, boilermaker, etc. The incorporators are Clarence F. Smith, Edmund E. Cummings, Henry J. Frihey, Peter Bercovitch and Ernest Lafontaine, all of Montreal.

F. R. Wilford & Co., Ltd., Lindsay, Ont., has been incorporated with a capital stock of \$100,000 to manufacture machinery and act as general contractor. The incorporators are Frederick R. Wilford, Gerald H. Hopkins, George D. Donaldson and Alfred E. Gregory, all of Lindsay.

A roundhouse for the Intercolonial Railway at Fredericton, N. B., is contemplated. F. P. Gutelius, Moncton, N. B., is general manager.

James, Loudon & Hertzberg, consulting engineers, Toronto, are preparing plans for waterworks system for Unionville, Ont.

The Thomas Wilson Lumber Company, Ltd., Ottawa, has been incorporated with a capital stock of \$75,000 to manufacture lumber. The incorporators are Harold Fisher, Stanley G. Metcalfe, Robert Laurier, William O'Meara and Joseph L. Valentine, all of Ottawa.

The Canadian Tar Products Company, Ltd., Montreal, is erecting a new still, boiler house and condenser house.

The sawmill of Cleophas Gagnon, St. Cecile de Whitton, Que., has been destroyed by fire.

The bakery of James Strachen, Ltd., 246 City Hall avenue, Montreal, has been damaged by fire to the extent of \$100,000.

The Ontario Government has decided to offer for sale by tender a pulp wood limit of 2500 square miles near Lac Seul, north of the Transcontinental Railway. The successful tenderer will be required to erect a pulp and paper mill and expend \$1,750,000 on mill and equipment. G. H. Ferguson, Toronto, is Minister of Lands, Forests and Mines.

The Niagara Silk Mills, Ltd., Brantford, Ont., has decided to erect a new dyehouse.

A press despatch says that E. C. Gannon, New York, is negotiating for the purchase of the Calgary Power Company, whose plants have an approximate value of \$3,000,000.

The Colonial Brick & Stone Company, Ltd., Amherst, N. S., recently incorporated, has purchased the property of the Battye Brick & Quarry Company, Wallace Bridge, N. S., and will commence the construction of a plant.

Fire did \$3000 damage at the plant of the Renfrew Machinery Company, Renfrew, Ont.

The Diamond Cleanser, Ltd., Toronto, Ont., with a capital stock of \$40,000 has been incorporated to manufacture cleansing material, etc. The provisional directors are Ernest F. Griffith, 32 Radford avenue, Toronto; Thomas M. Watson, 23 Ridley gardens, Howard J. Fairty, and others.

The Township Council, Chatham, Ont., is preparing plans for a pumping and drainage system. The engineer in charge is W. G. McGeorge, 153 Queen street, Chatham.

The Canadian Smallwares Company, St. Thomas, Ont., will rebuild its plant, recently destroyed by fire. R. H. Dowler is in charge.

The ratepayers of Paris, Ont., passed a by-law to guarantee bonds for \$10,000 for Charles Wheeler & Son, who will enlarge and equip their factory with an entirely new line of machinery for the manufacture of latch needles.

The Montreal Power Factory Waste Company, 223 Wellington street, Montreal, Que., is in the market for a 3-hp. alternating-current motor.

The Hartwell Brothers, Ltd., Walkerville, Ont., has been incorporated by Belton A. Copp, Edward J. E. Ward and Fred G. Hartwell, 122 South Michigan avenue, Chicago, Ill., and Joseph A. Copp, Walkerville, Ont., with a capital stock of \$40,000 to manufacture hardware, woodenware, lumbermen's supplies, etc.

The machine shop of T. Hogan & Co., 121 Walter street, Halifax, N. S., was completely destroyed by fire.

St. Lambert, Que., will spend \$2,000,000 on sewers and a disposal plant. E. Drinkwater is town engineer.

New Liverpool, Que., will install an electric lighting plant and system. J. Hamelin is commissioner.

The Dominion Sugar Company, Wallaceburg, Ont., will build a sugar plant at Chatham, Ont.

The T. Eaton Company, 190 Yonge street, Toronto, Ont., will build a factory on John street. J. C. Eaton is president.

The Canadian Northern and the Great Northern railways will construct terminal buildings, turntables, roundhouses, etc., at Hope, B. C. The construction work will begin in a few weeks.

The Hastings County Marble Company, Ltd., Toronto, Ont., has been incorporated with a capital stock of \$100,000 to manufacture marble, stone, etc. The incorporators are Gordon B. Balfour, room 301-303 Continental Life Building, Toronto, James Parker, John M. Duff, and others.

The Acason Motor Truck Company, Ltd., Walkerville, Ont., has been incorporated with a capital stock of \$40,000 to manufacture motor vehicles, engines and accessories. The incorporators are Herbert W. Acason, Wilson Critzer, and others, all of Detroit, Mich.

George Rivers has secured a site and will commence work at once on the construction of a basket factory at Strathroy, Ont.

The Acadia Sugar Refinery Company, Moncton, N. B., will rebuild its cooperage plant, recently destroyed by fire.

The Canadian Box Mills, Sherbrooke, Que., will build a boxmill to cost \$15,000.

The Canadian Wolverine Brass Company, St. Clair street, Chatham, Ont., has let a contract for rebuilding its brass plant, which was destroyed by fire, to B. Bonde, 14 Cornhill street. Further contracts will be let later.

The F. S. Newman Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$100,000 by John M. D. O'Grady, Easton K. Williams, Napier H. Layton, and others, of Winnipeg, to carry on the business of iron foundries, machinists, etc.

The Kennedy Lumber Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$50,000, with Robert Siderfin, John Ledingham, William J. Allen, and others, as its provisional directors, to manufacture lumber, timber, etc.

The Saskatchewan Broom Manufacturers, Ltd., Regina, Sask., has recently been incorporated with a capital stock of \$20,000 by C. A. Mahin, B. C. Moore, Adam Keys, and others. It will build an addition to its plant and install new machinery.

A Lee has purchased the Taylor elevator at Vulcan, Alberta, and will erect another with a capacity of 30,000 bu.

The Lanark Mining Company, Revelstoke, B. C., will shortly commence work on a 7000-ft. tramway. The equipment will cost about \$15,000. It is further planned to install a powerplant, etc.

Ground will be broken at an early date at Winnipeg, Man., for the construction of an assembling plant for the Ford Motor Company of Canada, to cost \$250,000.

The Alberta Hydro-Electric Power Company, Calgary, Alberta, of which A. W. E. Fawkes, 518 Burns Building, is consulting engineer, is contemplating the construction of six dams and powerhouses at a cost of \$2,000,000.

The Moose Jaw Sash & Door Company, Ltd., Moose Jaw, Sask., with a capital stock of \$30,000 has been incorporated to manufacture lumber, doors, sashes, etc.

Government Purchases

WASHINGTON, D. C., June 14, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until June 22, schedule 8451, one hydraulic jib crane for Norfolk; schedule, 8452, one bending press and one automatic cut-off saw, both for Charleston, S. C.; schedule 8455, miscellaneous involute cutters, for Newport; schedule 8466, one dovetailing machine; schedule 8474, one flat top turret lathe, one universal milling machine, one vertical milling machine, all for Charleston, S. C.; until June 29, schedule 8470, two automatic machines for Newport.

The lighthouse inspector, 19 Congress street, Boston, Mass., will receive bids until 2 p.m. June 17, for two oil engines and air compressors.

The purchasing officer of the Panama Canal, Washington, will soon issue bids for the purchase of twelve towing locomotives of 85,073 lb. weight each, and necessary equipment.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, June 8, for supplies for the navy yards, as follows:

Schedule 8270, Steam Engineering

Class 11, Mare Island—One radial drill—Bid 129, \$4050 and \$4087; 199, \$2345; 210, \$2600.

Alternate—Same, f.o.b. works—Bids 129, \$3552 and \$3587; 199, \$2045; 210, \$2300.

Schedule 8323, Ordnance

Class 181, Newport—Four automatic screw machines—Bid 40, \$1039.70; 166, \$2408; 198, \$862.50.

Class 182, Newport—42 sliding-head drills—Bid 91, \$264; 99, \$235; 130, \$264; 149, \$214 and \$230; 166, \$380 and \$225; 192, \$223; 199, \$275; 224, \$228 and \$378.36; 313, \$425.

Class 183, Newport—Two tool-room shapers—Bid 99, \$562; 100, \$395 and \$462; 154, \$330 and \$452; 192, \$318; 224, \$562.19; 313, \$485; 314, informal.

Class 184, Newport—Three universal milling machines—Bid 40, \$1152; 100, \$1160; 166, \$1300; 199, \$1430; 313, \$1100.

Class 185, Newport—Two milling machines—Bid 100, \$1050.75; 285, \$1060.75; 313, \$1060.75.

Class 186, Newport—Two single belt-driven shapers—Bid 91, \$560; 99, \$735; 100, \$395 and \$590; 154, \$378.50 and \$583; 166, \$652; 192, \$499; 199, \$705; 224, \$740.67; 313, \$495.

Class 188, Newport—Four sensitive drill presses—Bid 92, \$184; 100, \$216; 149, \$207.50; 166, \$371; 192, \$215; 208, \$239.75 314, informal.

Class 189, Newport—Two turbine bucket-cutting machines—Bid 35, \$1850.

Class 190, Newport—Four screw-cutting engine lathes—Bid 128, \$806; 166, \$790.

Alternate—Same, with motor drive, 110 volts direct current—Bid 128, \$1086 and \$926.

Class 191, Newport—Four turret lathes and two turret threading attachments—Bid 141, \$6454 and \$5254; 224, \$6790.

Class 192, Newport—Two turret lathes—Bid 224, \$2189 and \$2197.

Schedule 8315, Navigation

Class 141, Norfolk—One combined scroll and resawing machine—Bid 12, \$473 and \$520; 97, \$530.70 and \$330.61; 166, \$449; 203, \$535.

Schedule 8318, Construction and Repair

Class 162, Norfolk—One motor-driven planer—Bid 73, \$4940, \$4900, \$4455 and \$4030; 149, \$3380.

Schedule 8327, Construction and Repair

Class 231, Charleston and Norfolk—Hoisting engines, with spares—Bid 6, \$5397.58; 20, \$3552; 59, \$6591; 65, \$3738.75; 112, \$2912.30; 145, \$3853.70; 161, \$2663.50.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 6, American Hoist & Derrick Company; 12, American Woodworking Company; 20, A. A. Libby; 35, E. W. Bliss Company; 40, Brooklyn Galvanizing Company; 59, Clyde Iron Works; 65, Thomas Carlin's Sons; 73, Dietrich & Harvey Machine Company; 91, Fairbanks Company; 97, J. A. Fay & Egan Company; 99, E. L. Fraser; 100, Frevert Machinery Company; 112, Glover Machine Works; 128, Hendey Machine Company; 129, Harron, Rickard & McCone; 130, Hoefer Mfg. Company; 141, Jones & Lamson Machine Company; 145, Nelson Kent; 149, Kemp Machinery Company; 154, R. A. Kelly Company; 161, Lenher Engineering Company; 166, Manning, Maxwell & Moore; 192, D. Nast Machinery Company; 198, National Acme Mfg. Company; 199, Niles-Bement-Pond Company; 203, Oliver Machinery Company; 208, Pratt & Whitney Company; 210, Pacific Tool & Supply Company; 224, Prentiss Tool & Supply Company; 285, Van Norman Machine Tool Company; 313, Hill, Clarke & Co., Inc.; 314, Brownell Machinery Company.

Trade Publications

Castings.—Maher & Flockhart, 60 Polk street, Newark, N. J. Catalogue. Shows various designs of special castings such as sewer and manhole frames and covers, gutter bridges, grate bars, screw jacks, fence and mooring posts, japanning and smelting kettles and contractors' tools. The catalogue is made up almost entirely of halftone engravings, the only text being the captions of the cuts. Mention is also made of a line of light and heavy machinery castings of all descriptions that can be supplied up to a maximum weight of 25 tons.

Copper-Lead Alloy.—United Lead Company, 111 Broadway, New York City. Pamphlet. Presents a brief description of a copper-lead alloy known as Ulcoloy. This alloy is intended to replace high lead bronzes which contain tin as a bearing metal, a metallic packing and in castings that are required to resist the action of acids or for ornamental purposes. The advantages of the alloy in these fields are briefly discussed. Tables of the sizes of bushings which are regularly carried in stock and data on the approximate melting points of the metals and the composition of various alloys are included.

Special Threading Tools.—Geometric Tool Company, New Haven, Conn. Cloth-bound book. Size, 4 x 7 1/4 in.; pages, 95. Covers a line of special threading tools which includes self-opening and adjustable screw cutting, taper threading and solid adjustable die heads, adjustable hollow milling tools, adjustable collapsing taps and threading machines. Illustrations and descriptions of the various tools are presented together with instructions on their use, numerous views of the various heads taken apart being included. Instructions on the grinding of the chasers are also given. The threading machine is designed for work that cannot be produced on the regular screw machine where accurate work is required in quantities. Views of the machine showing the various adjustments are presented together with specification tables of the various die heads. A number of tables of useful information are included.

Pneumatic Water Supply Systems.—Humphries Mfg. Company, Mansfield, Ohio. Catalogue No. 102. Size, 6 x 9 in.; pages, 64. Describes a line of complete hand and power hydro-pneumatic water supply systems for public and private buildings and industrial plants.

Automatic Time Switches, Charging Plugs and Receptacles.—Albert & J. M. Anderson Mfg. Company, Boston, Mass. Bulletins No. 32 and 33. The first takes up several types of charging plugs and receptacles for charging storage batteries on electric vehicles, trucks and railroad cars. The second covers a line of automatic time switches for use with illumination systems, charging batteries and controlling supply of current.

Circular Storage System.—Link-Belt Company, Chicago, Ill. Bulletin No. 221. Calls attention to a circular storage system for coal and similar material in which a long-radius locomotive crane is used. It consists of the crane equipped with a grab bucket and traveling on curved tracks around the circular point from which the bucket receives its load. The advantages claimed for this storage system are low investment, low operating costs, low insurance charge, flexibility and dependability. A brief description of the system is given and the advantages are touched upon at some length. Illustrations of installations of this system and a diagram showing the way in which it operates are presented.

Drilling Machines.—Baush Machine Tool Company, Springfield, Mass. Collection of bulletins. Refers to a line of multiple and radial drilling machines which are built in a number of different sizes and styles, a separate bulletin being devoted to each. In each of the bulletins an illustration of the particular tool described is given together with a brief mention of the principal features of it and a condensed table of specifications. Mention is also made of portable multiple-spindle drilling heads that can be supplied for these machines.

Universal Joints.—Blood Bros. Machine Company, Kalamazoo, Mich. Folder. Describes briefly a type of universal joint for use where light loads are to be transmitted and the angle between the two parts is not over 5 deg. One of the special features of the joints is that there are no metal bearings, the ends being connected together with heavy leather disks or rings. An illustration of the joint is presented together with a view showing the arrangement of the disks.

Metal Working Machinery.—Dreses Machine Tool Company, Cincinnati, Ohio. Two collections of loose leaf circulars. The first presents illustrations with brief descriptions and specification tables of a line of plain and universal radial drilling machines and a heavy drilling, boring, facing and tapping machine. The make-up of the circulars is identical, a general view of the machine being given on the out-

side page with views of the various parts on the inside pages to supplement the text description. The second collection covers a line of screw and turret machinery in practically the same way.

Ball Bearings.—S K F Ball Bearing Company, 50 Church street, New York City. General bulletin No. 40. Describes and illustrates ball bearings of the radial, adapter and single and double thrust types. The construction, design and manufacture of the bearings is gone into at some length, followed by instructions for mounting the various kinds of bearings. Instructions on the selection of the proper size of bearings are given, together with tables of the various bearings that can be supplied. A number of illustrations of bearings applied to machinery of different kinds are included.

Force Feed Lubricator and Hand Punch.—Krahn Mfg. Company, Milwaukee, Wis. Two folders. The first pertains to a force feed lubricator which is designed for direct or ratchet drive, either from the end or at a right angle, for high or low pressure work. The operation of the lubricator is described at some length, the text being supplemented by a number of engravings. The various features of the lubricator are briefly touched upon. The hand punch is designed for use in offices for punching papers for filing. An illustration of the punch which will make a hole through 3/4 in. of paper is included.

Vertical Surface Grinding Machine.—Blanchard Machine Company, Cambridge, Mass. Circular. Discusses the method of construction and operation of a direct motor-driven type high power vertical surface grinding machine. Placing the motor in the wheel head with its armature directly on the spindle eliminates all belts and pulleys, and special care has been taken to protect it from dust and moisture by a special ventilating system. The original type of machine was described in *The Iron Age*, October 13, 1910. A continuous reading caliper attachment is also described and illustrated.

Foundry Riddles.—E. J. Woodison Company, 1200 Niagara street, Buffalo, N. Y. Booklet. Explains the workings of and illustrates the electrically operated Combs gyratory riddle which is claimed to do the work of 10 men using hand machines. A number of testimonials and a list of firms using the machine are included.

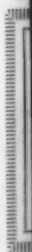
Calendar.—Wagner Electric Mfg. Company, 6400 Plymouth avenue, St. Louis, Mo. Calendar hanger. Is free from practically all advertising matter, the only prominent feature being the use of the company's phrase "Wagner, Quality." The main portion of the hanger represents a section of the heavens and in place of some of the stars are faintly outlined the company's products. The calendar pad covers 13 months beginning June 1, 1915, and on the hanger under the pad is a calendar from July 1, 1916, to June 30, 1917.

Power Transmission Appliances.—Oneida Steel Pulley Company, Oneida, N. Y. Bulletin No. 03 and catalogue No. 5. The first gives illustrations and brief descriptions of a line of power transmission appliances including post and ceiling shafting hangers, pillow blocks, countershaft fixtures and shafting collars and couplings. Tables of the various sizes that can be supplied are included. The catalogue relates to a line of steel and wood pulleys that are made in a great variety of sizes and face widths. Tables of sizes are included and emphasis is laid upon the amount of belt adhesion that can be secured.

Small Metal Working Machinery.—W. W. Oliver Mfg. Company, 1483 Niagara street, Buffalo, N. Y. Catalogue No. 18, superseding No. 17. Describes briefly a line of small rolling mills, speed lathes, polishing machines, drop presses, draw benches and upright drilling machines. For the most part a pair of facing pages is given to each particular tool, an engraving being presented on one page with a brief description on the opposite one. Mention is also made of a number of accessories, such as countershafts, chucks, spindles, etc.

Cutting-Off Machines.—W. P. Davis Machine Company, 311 St. Paul street, Rochester, N. Y. Catalogue No. A-2. Concerned with a line of cutting-off machines that are built in three sizes, 3, 4 1/2 and 6 in. The work of the machine is compared with that of the cold sawing machine, and mention is made of the simple accelerating arrangement employed. Illustrations and brief descriptions of the three sizes of machines follow. Attention is called to the steel used in the tools of this machine, and information on a number of interesting points about cutting metal is included.

Laboratory Equipment.—Queen & Co., 1010 Chestnut street, Philadelphia, Pa. Collection of circulars. Illustrate and describe laboratory apparatus, such as single and double Geissler tubes, stratification and phosphorescent mercury tubes, radiometers, photometers, testing sets, portable and stationary tachometers, clamps, Bunsen burners, etc.



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